Founded in 1832

RAILWAY LOCOMOTIVES AND CARS

JUNE 1955

One of Five Specialized Railway Age Publications

formerly Railway Mechanical and Electrical Engineer

Talgo—1955

Hydrafriction Cushioning

B&O DuBois Car Shop

PRR Motive Power Study

PROVIDE A COMPLETE DEVICE FOR SECURING LADING BANDS...

New WINE

Universal LADING BAND ANCHOR

ROTATES 360 degrees

EASILY APPLIED ON ALL FLAT CARS AND GONDOLAS..

TOP COPING APPLICATION

DROPS FLUSH WHEN NOT IN USE

APPROVED BY A. A. R. AS AN ALTERNATE STANDARD

THE WINE RAILWAY APPLIANCE CO., TOLEDO 9, OHIO

The Bills You Hate to Pay...

We all have them! They're the price we pay to support all the outmoded things we own—like the car with worn piston rings or the house with rusted iron water pipes.

All of the new products and materials developed by American industry for better living, have one thing in common—they not only do a better job, but they actually pay for themselves because they cost less to maintain.

That's why Truslock is your best hangered brake beam buy! Truslock's completely new design means better performance and longer life . . . and equally important—less maintenance cost.

The reason is simple enough. Truslock's quick-change brake head can be replaced in a jiffy—without special tools or the need to disassemble the truss and rebuild the entire brake beam.

And because brake head changes account for at least 50% of all brake beams sent to your reclamation plant, it stands to reason that Truslock owners are cutting brake beam reclamation costs right down the middle.

YOUR FIRST BRAKE HEAD CHANGE ON A TRUSLOCK WILL SAVE YOU MORE THAN THE SMALL PREMIUM YOU PAY FOR THIS TOP-PERFORMANCE BRAKE BEAM . . . *MAKES TRUSLOCK THE LOWEST COST NO. 18 BRAKE BEAM YOU CAN BUY.*

Buffalo Brake Beam Company, New York

ROAD WASHES CARS STREAK-FREE

WITH A 75% SAVING IN CLEANER COST

Improved Oakite Compound No. 88 banishes road-soil — even coach windows come out spotless

The coach-washing compound used formerly at one terminal washed away accumulated oil, grease and crater dust all right. But while it solved one problem, it created another. Car sides and windows streaked badly. Dissatisfied with results, the company called Oakite.

The Oakite Technical Representative recommended Oakite Compound No. 88 for the job. He lent a hand—first, in seeing that the material was used properly; and, then, in making needed adjustments at the washer to get maximum results. In the first trial, a 3 ounce per gallon solution showed a big improvement. Not satisfied, the Oakite man reduced the concentration to 1 ounce. While this eliminated all streaking, it did not remove all dirt. So, 1½ ounces were used. That did it! With 125 cars washed that night, morning inspection revealed 125 shining examples of cleaning efficiency. Sides were streak-free, glass sparkled, dirt had vanished.

What's more, the cars not only were cleaned better, but also at 75% less materials-cost—each car taking about 10¢ worth of material instead of the former 45¢.

Oakite has materials for manual and automatic methods that speed and simplify car washing.

Proving that . . . in railroad cleaning, it pays to call in Oakite, because you get cleaning *results*, and not just cleaning *materials*.

IDEAS FOR SAVING in maintenance cleaning are given in this 56-page Booklet No. F-8055. Data include methods for cleaning running gear, filters, Diesel units, electrical equipment, and other tedious, time-consuming yard problems. For your free copy write Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

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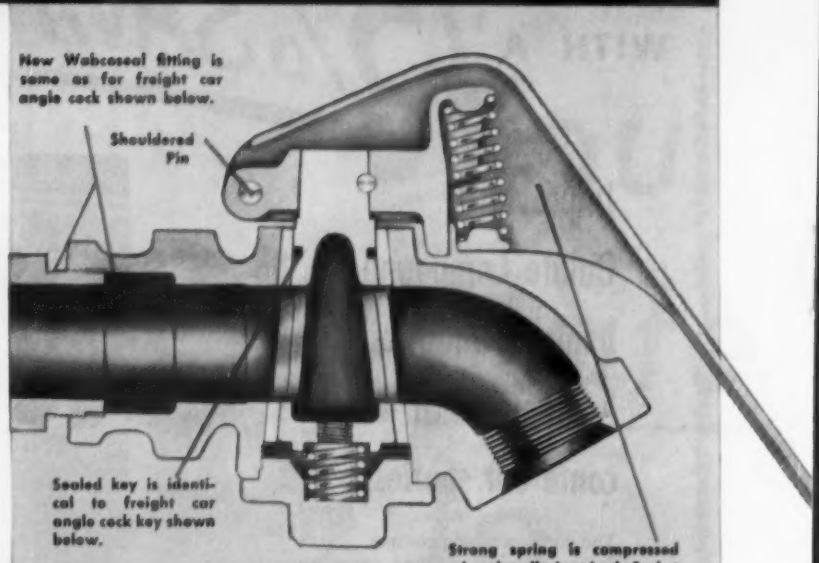
OAKITE®

RAILWAY DIVISION

New WABCOSEAL® Angle Cock

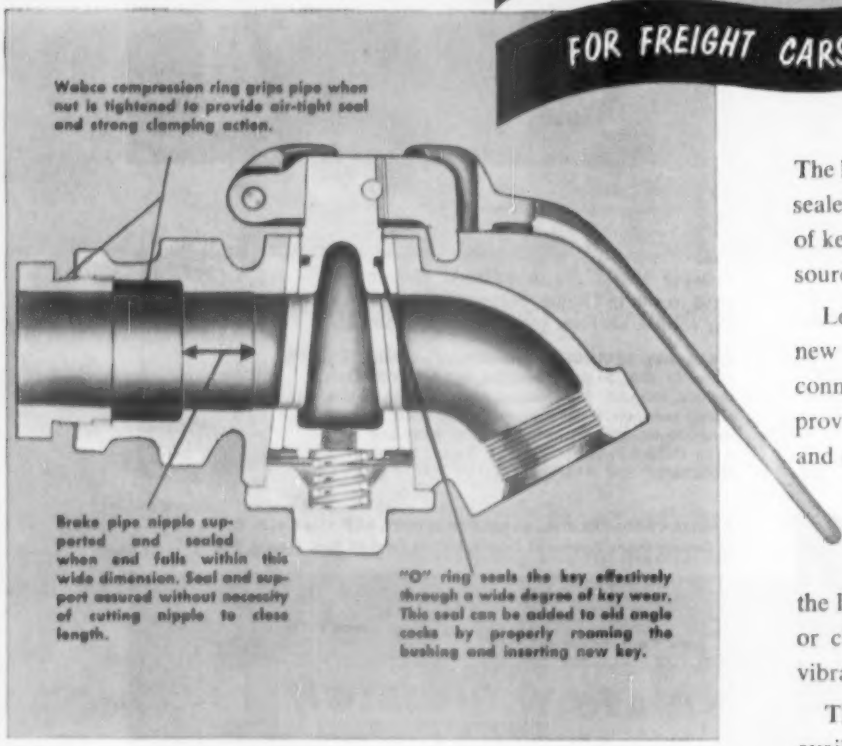
Stops air leakage

At brake pipe nipple and top of key


New Wabcoseal fitting is same as for freight car angle cock shown below.
Shouldered Pin
Sealed key is identical to freight car angle cock key shown below.
Strong spring is compressed when handle is raised. Socket is snapped into locking position when handle is fully opened or closed. Available for application to angle cocks now in use. A shouldered pin provides proper freedom of handle movement.

FOR PASSENGER CARS AND LOCOMOTIVES

FOR FREIGHT CARS


Wabco compression ring grips pipe when nut is tightened to provide air-tight seal and strong clamping action.
Brake pipe nipple supported and sealed when end falls within this wide dimension. Seal and support assured without necessity of cutting nipple to close length.
"O" ring seals the key effectively through a wide degree of key wear. This seal can be added to old angle cocks by properly reaming the bushing and inserting new key.

The heart of the new Wabcoseal Angle Cock is the sealed key that stays tight through a wide degree of key wear. This eliminates one of the two major sources of air leakage in angle cocks.

Leakage at the other source is prevented by a new Wabco compression ring at the brake pipe connection which eliminates tapped threads to provide an air-tight seal with increased strength and end tolerance for the brake pipe nipple.

For passenger cars and locomotives the Wabcoseal Angle Cock has a spring-locking handle that snaps the socket into the locked position when the handle is fully open or closed and keeps it there despite shock and vibration.

The sealed key and spring locking handle are available separately for application to angle cocks in service. See your Westinghouse Air Brake representative for more information.

Westinghouse Air Brake
COMPANY
AIR BRAKE DIVISION WILMERDING, PENNA.

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RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

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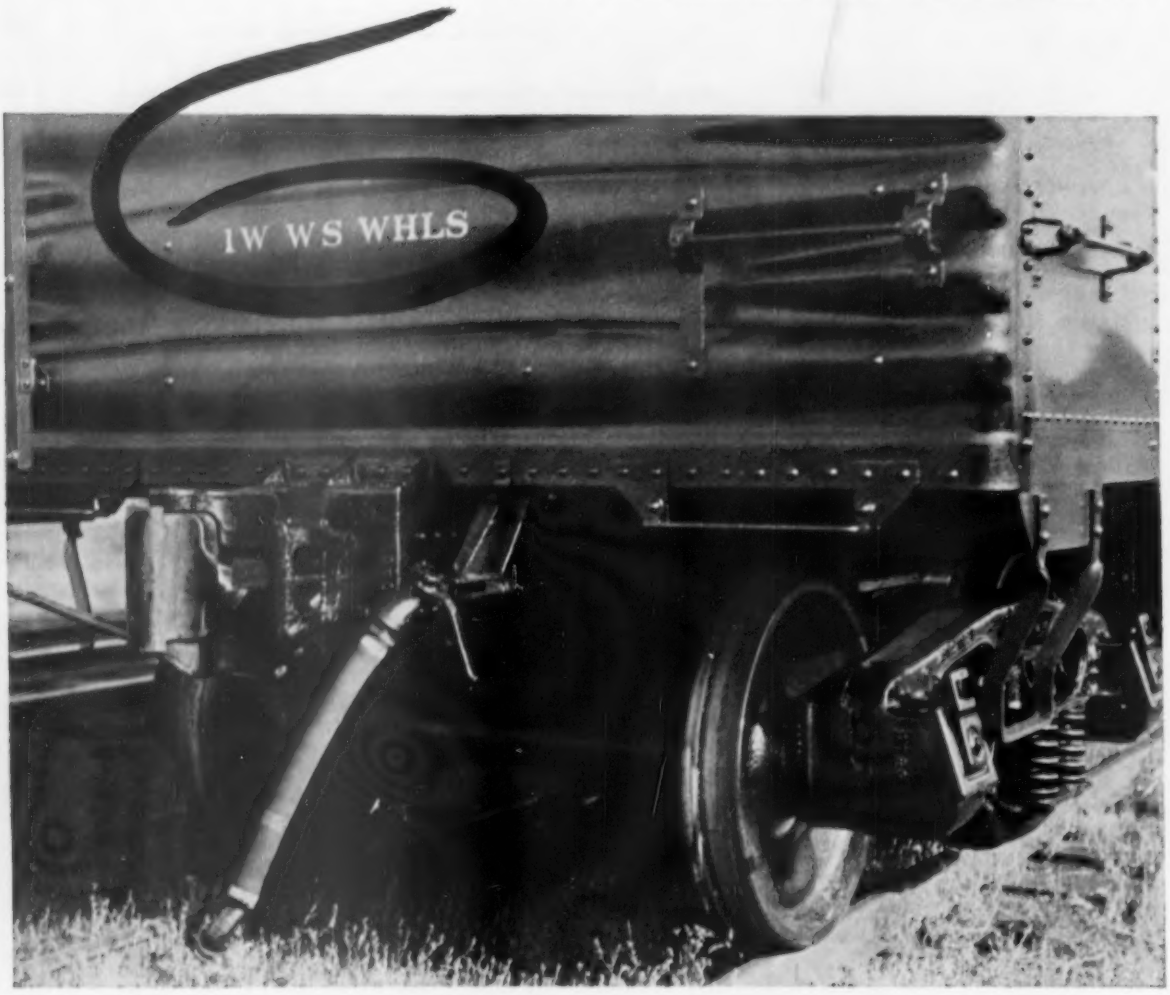
For Freight Service Too?

Wrought steel wheels are standard for diesel and passenger car service, because they are the best available. Why take less than the best for your revenue-producing freight service? Here's what you get in Armco One-Wear Wrought Steel Wheels:

- **Long life—usually still serviceable when car needs major repairs**
- **Faster freight schedules with greater safety**
- **Shipper satisfaction—less train delay to set out cars**
- **Reduced maintenance**

Armco One-Wear Wrought Steel Wheels have the strength and toughness found *only* in a forged and rolled wheel. They have demonstrated their superiority in freight service for more than 20 years—are the product of a plant with 46 years of wrought steel wheelmaking experience.

Your freight cars are worth the best. Investigate these wheels. Just contact the nearest Armco District Office or write at the address below.



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SPECIAL STEELS

SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • ARMCO INTERNATIONAL CORPORATION

The correct answer to wear troubles in top ring groove. A pioneer in the field of replacement pistons up to 16" in diameter, Ohio Piston Company bonds Ni-Resist inserts to ring carriers by the Al-Fin process. Under controlled conditions similar to those used in producing original equipment pistons for large engine builders.

How Ni-Resist inserts
are protecting diesel engine pistons

Records attest to the remarkable life and performance obtained by using NI-RESIST® top ring carriers in automotive and industrial service.

Under the most adverse conditions faced by heavy-duty aluminum pistons, Ni-Resist inserts help to step up power and reduce maintenance . . . because, wherever used, they have sharply reduced ring groove wear.

And now, NI-RESIST inserts are being adapted to lengthen life and mileage of pistons in railway diesel engines. The first installation has already been made. In an engine operated by the Alton and Southern Railroad.

When examined after extensive road service under severe loads, these pistons with NI-RESIST inserts appeared perfect. And their outstanding performance continues.

Adapting Ni-Resist inserts for railway use has been pioneered by Ohio Piston Company of Cleveland, in cooperation with the Development Laboratories of the Aluminum Company of America.

This means your aluminum pistons with worn grooves can now be repaired to give greatly increased mileage. Simply by removing the old all-aluminum carriers, and welding in place, new Ni-Resist-aluminum bonded carriers. Moreover, the thermal expansion of Ni-Resist, closely matching that of aluminum, prevents joint failure.

Less costly than a brand new piston, the repaired unit answers a basic need: top ring groove protection in the zone where heat, corrosion and wear tend to be excessive. Ni-Resist inserts withstand heat, corrosion, metal-to-metal wear and galling.

No other cast metal provides such a useful combination of engineering properties. If you build or operate diesel engines, get the facts about Ni-Resist. Read the new illustrated INCO booklet, "Engineering Properties and Applications of Ni-Resist." It's yours for the asking. Write for your copy now.

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NEWS. . . . . .

Mechanical Division To Meet At Montreal June 21-23

The sessions of the 28th annual meeting of the Mechanical Division, Association of American Railroads, will be held in the Ball Room of the Sheraton-Mt. Royal Hotel, Montreal, June 21, 22 and 23. The meeting will convene at 10 a.m., daylight saving time, Tuesday, June 21. It will be a joint session of the Mechanical Division with the Electrical Section of the Mechanical and Engineering Divisions. The program for the meeting is as follows.

TUESDAY, JUNE 21

Joint Session

10 a.m.

Address by N. R. Crump, president, Canadian Pacific.

Address by R. G. May, vice-president, Operations and Maintenance Department, AAR.

Mechanical Division

Address by D. S. Neuhart (chairman), general superintendent motive power and machinery, Union Pacific

Action on Minutes of 1953 meeting

Appointment of Committees on Subjects, Resolutions, etc.

Unfinished business

New business

Report of General Committee

Report of Nominating Committee

Discussion of reports on:

- Locomotives
- Axles
- Geared Hand Brakes
- Safety Appliances
- Specifications for Materials

WEDNESDAY, JUNE 22

9:30 a.m.

Address by The Honorable Owen Clarke, member, Interstate Commerce Commission.

Discussion of reports on:

- Arbitration
- Prices for Labor and Materials
- Brakes and Brake Equipment
- Loading Rules

Luncheon

Address by S. F. Dingle, vice-president—operations, Canadian National, at luncheon sponsored by Canadian Railway Suppliers' Committee

Afternoon

Discussion of reports on:

- Special Committee on Forest Products Loading
- Couplers and Draft Gears
- Lubrication of Cars and Locomotives
- Wheels

THURSDAY, JUNE 23

9:30 a.m.

Address by C. G. A. Rosen, Caterpillar Tractor Company.

Discussion of reports on:

- Tank Cars
- Car Construction

Election of members of General and Nominating Committees

Report of Committee on Resolutions

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE MAY ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road	No. of units	Horsepower	Service	Builder
Canadian National	1	1,750		General Motors Diesel, Ltd.
	1	2,400	"Trainmaster" general purpose	Canadian Locomotive
Northern Pacific	33[1]	1,750	Road switching	Electro-Motive
	1A[1]	1,750	Freight	Electro-Motive
	3[1]	1,200	Switching	Electro-Motive
	1[1]	1,600	Road switching	Alco Products

FREIGHT-CAR ORDERS

Road	No. of cars	Type of car	Builder
Canadian National	200	50-ton refrigerator	National Steel Car
	30	30-ton ore	Marine Industries, Ltd.
Chesapeake & Ohio	250[2]	Box	Pullman-Standard
	250[2]	Box	ACF Industries
Chicago, Rock Island & Pacific	100[3]	70-ton covered hopper	Pullman-Standard
Erie	300[4]	50-ton box	Greenville Steel Car
	200[5]	50-ton box	General American Trans.
Louisville & Nashville	200[6]	50-ton pulpwood	ACF Industries
New York Central	200	70-ton covered hopper	Despatch Shops
North American Car Corp.	55[7]	70-ton covered hopper	Pullman-Standard
St. Louis Southwestern	50[7]	50-ton pulpwood	Company shops
Southern Pacific	350[8]	70-ton hopper	Pullman-Standard
Western Maryland	50[9]	50-ton box	General American Trans

PASSENGER-CAR ORDERS

Road	No. of cars	Type of car	Builder
Canadian National	20[10]	Baggage	National Steel Car

[1] Delivery scheduled for third quarter of this year.

[2] This order for 500 cars was incorrectly reported in the May issue as having been placed entirely with Pullman-Standard.

[3] Cost per unit, $7,350. To have been delivered in April and May.

[4] The Greenville cars will be 50 ft, equipped with double doors and Armco steel floors. The GAT cars will be equipped with damage-free stowing devices for shipping automobile parts and other freight. Deliveries of the former expected to start July 15; deliveries of the latter to begin in September. Estimated cost of the 500 cars, $4,500,000.

[5] Estimated cost, $1,100,000. Delivery expected in July.

[6] Estimated unit cost, $7,600. To have been delivered in May.

[7] Estimated cost, $257,000. To be delivered during June and July.

[8] Cost to exceed $3 million. To be delivered during June and July.

[9] Estimated cost, $425,000. To be delivered during June.

[10] For delivery late this year.

NOTES:

Bessemer & Lake Erie.—The B&LE will place 250 of its 70-ton hopper cars in the shops of the Greenville Steel Car Company for heavy repairs. Work is scheduled to begin in August.

Delaware, Lackawanna & Western.—The Lackawanna will convert 84 additional hopper cars into flat cars for piggyback service at a cost of $420,000. Work will be done in company shops.

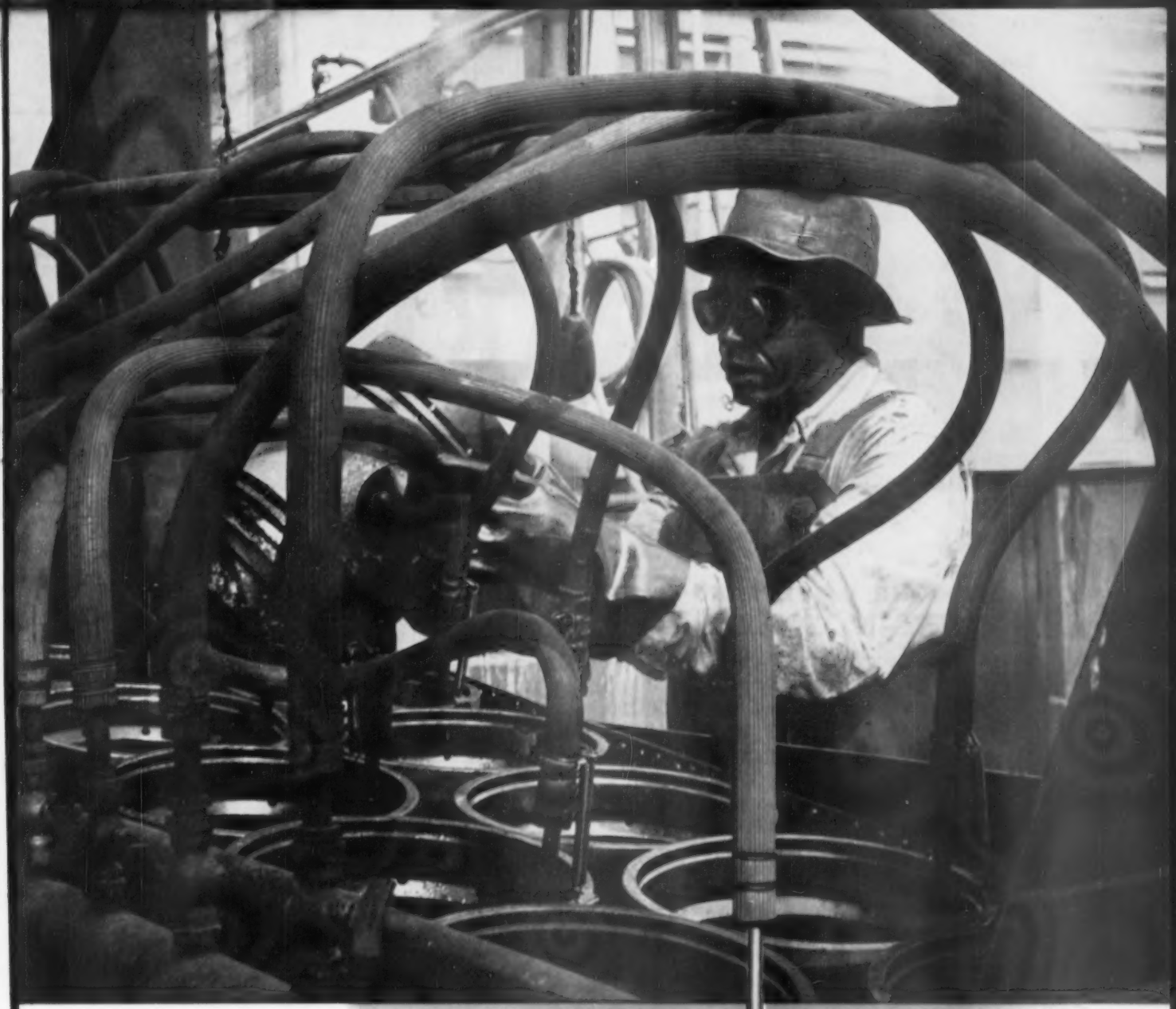
Seaboard Air Line.—The SAL will rebuild in its own shops 300 50-ton gondola cars at an approximate cost of $987,000.

Shippers' Car Line Corporation.—Shippers', an ACF Industries subsidiary, has announced a new type container car for bulk movement of powdered or granular products, 1,000 of which are expected to be in operation within five years. Each car has 28 separate aluminum containers, all of which, it is said, can be unloaded by one man in one hour.

Western Pacific.—The directors of this road have authorized the purchase of eight 1,750-hp general purpose diesel units at an approximate cost of $1.5 million.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
February, 1951	2,425,226	4,528	14,063	18,591	130,452
February, 1952	2,809,162	2,723	6,473	9,196	305,477
1953					
January	2,828,906	2,219	4,123	6,342	446,059
February	2,625,563	2,111	4,059	6,170	425,537
March	2,904,227	2,696	6,077	8,769	331,192
April	2,850,752	3,383	6,435	9,818	290,359
May	3,013,610	5,892	11,433	17,325	173,945
June	2,926,001	8,537	15,296	23,833	122,771
July	2,925,317	9,342	15,775	25,117	116,467
August	2,971,020	8,638	14,160	22,798	130,319
September	2,822,222	6,083	10,195	16,278	173,376
October	3,042,558	3,863	6,493	10,356	293,796
November	2,788,773	1,987	3,404	5,391	517,301
December	2,656,063	1,581	2,550	4,131	642,958
1954					
January	2,583,485	3,082	3,797	6,879	375,561
February	2,445,214	2,953	4,066	7,019	348,370
March	2,658,757	2,196	3,637	5,833	455,813
April	2,570,518	3,079	5,149	8,228	312,411
May	2,713,511	4,416	6,510	10,926	248,353
June	2,662,375	6,597	9,617	16,214	164,202
July	2,678,234	7,956	10,912	18,868	141,946
August	2,696,135	7,568	9,742	17,310	155,756
September	2,614,432	6,740	8,882	15,622	167,355
October	2,852,825	5,182	6,985	12,167	234,472
November	2,717,219	2,515	3,467	5,982	454,232
December	2,751,644	1,501	2,294	3,795	725,070
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701



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IT'S CLEANED...WITH **TRANSPO**...BY TURCO

Better Diesel aluminum piston cleaning...and cleaning other aluminum parts...in less time with complete safety is the unfailing result when Turco Transpo is used. Transpo, like other Turco compounds, was *developed especially* for railroads. It stands as a good example why, for any cleaning job...*railroad cleaning job* ...America's leading railroads...turn to **Turco**...*first!*

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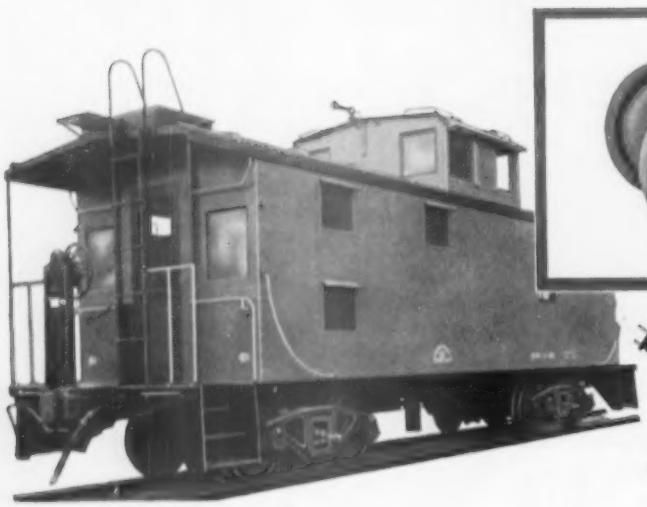
BRAKEMAN Gets a Break!

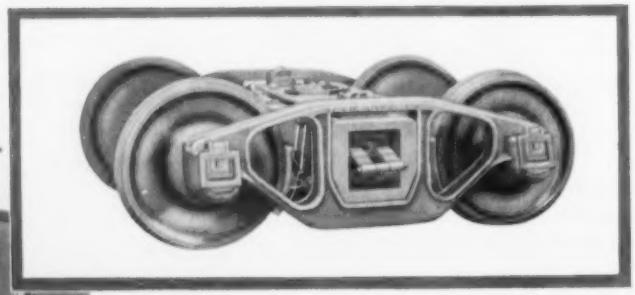
HOW HE GOES FOR THAT *SWING-MOTION* RIDE...

Barber-Bettendorf Swing-Motion Trucks treat your trainmen to a comfortable ride . . . and they're good business for you, too. Trip fatigue and irritation are reduced; trainmen remain alert and efficient . . . and it's a *safer* ride! The severe lateral shocks and thrusts of today's high speed freight operation are properly cushioned.

Built like passenger car trucks, Barber-Bettendorf Swing-Motion Trucks have a bolster and elliptical spring assembly suspended by four off-center swing hangers, inside a one-piece cast steel transom. The bolster swings; the off-center suspension tends to bring the car body back into line, minimizing side shocks. Send for detailed information. Standard Car Truck Company, 332 S. Michigan Ave., Chicago 4, Ill. *In Canada:* Consolidated Equipment Co., Ltd., Dominion Square Bldg, Montreal 2.

BARBER-BETTENDORF





SWING-MOTION

CABOOSE CAR TRUCKS

Welding Show

New applications of the welding process for industry will be the theme of the American Welding Society's Welding Show which will be held at the Municipal Auditorium, Kansas City, Mo., June 8 to 10. Technical sessions of the society's national spring meeting, which will start a day earlier, also will emphasize new uses for welding.

New Freight-Car Cushioning Device Being Tested on SP

A new freight-car cushioning device, developed by the Southern Pacific in cooperation with the Stanford Research Institute, is being tested by the railroad, D. J. Russell, SP president, has announced. Mr. Russell said the device, on which the SP is seeking patents, shows considerable promise, but that research and development will continue for possible refinements in design to make the device more suitable for volume production.

The device consists essentially of a friction brake actuated by a hydraulic mechanism built into a modified freight car underframe to cushion the shock when cars are coupled. Couplers are attached to a car-length sill "floating" inside the fixed-car underframe. Movements of this sill are slowed by the braking action of the hydra-friction unit, which is automatically in direct proportion to the force on either coupler. Adjustment between impact and cushioning reaction is said to be instantaneous.

Mr. Russell said the new device was first built and tested as a pilot model, then improved and built full size into a freight car constructed at the SP's Sacramento, Cal., shops. The prototype car is now in test service. Its performance, under various operating conditions, is being checked by the road's department of research and mechanical standards as well as by representatives of its freight protection, merchandise and station service. Because the new device makes use of a special design underframe, the SP chief executive pointed out, it cannot be applied to old cars, but if successful, will be built into other cars being built at Sacramento.

See page 61 for a detailed description of this device.—Editor.

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of February		2 months ended with February	
		1955	1954	1955	1954
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	4,626	6,685	9,429	14,567
3-06	Total, Diesel-electric	31,789	29,055	65,862	60,149
3-07	Total, electric	634	614	1,332	1,237
3-04	Total, locomotive-miles	37,239	36,429	77,027	76,099
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,464	1,380	2,993	2,848
4-06	Empty, total	809	814	1,717	1,678
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	10,437	12,541	20,976	27,508
6-02	Total in oil-burning steam locomotive trains	1,174	2,494	2,414	5,112
6-03	Total in Diesel-electric locomotive trains	88,368	80,145	182,166	164,406
6-04	Total in electric locomotive trains	1,900	1,878	4,003	3,726
6-06	Total in all trains	102,524	97,316	210,912	201,242
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.02	1.02	1.02	1.02
10-02	Loaded freight car-miles	42.10	40.60	41.60	40.20
10-03	Empty freight car-miles	23.30	24.00	23.80	23.60
10-04	Total freight car-miles (excluding caboose)	65.40	64.60	65.40	63.80
10-05	Gross ton-miles (excluding locomotive and tender)	2,946	2,861	2,930	2,838
10-06	Net ton-miles	1,325	1,260	1,306	1,252
12	Net ton-miles per loaded car-mile (M-211)	31.50	31.00	31.40	31.20
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	64.40	62.90	63.50	62.90
14	Averages per train hour (M-211):				
14-01	Train miles	18.80	18.90	19.00	18.80
14-02	Gross ton-miles (excluding locomotive and tender)	54,975	53,538	55,201	52,914
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	44.70	42.20	44.10	41.40
14-02	All	41.90	40.10	41.30	39.40
15	Average net ton-miles per freight car-day (M-240)	850	784	824	772
17	Per cent of home cars of total freight cars on the line (M-240)	50.60	53.60	51.70	53.60

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3-05	Steam	1,233	2,438	[1]2,683	5,334
3-06	Diesel-electric	19,064	19,063	40,282	40,290
3-07	Electric	1,273	1,323	[1]2,688	2,819
3-04	Total	21,571	22,825	45,654	48,444
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	214,910	227,429	457,964	484,844
4-09	Total in coal-burning steam locomotive trains	7,265	12,588	15,712	27,788
4-10	Total in oil-burning steam locomotive trains	2,577	7,285	6,439	16,283
4-11	Total in Diesel-electric locomotive trains	190,554	192,676	405,155	409,232
12	Total car-miles per train-miles	9.60	9.59	9.67	9.65

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours (000):				
1-01	Steam, coal-burning	236	321	476	695
1-02	Steam, oil-burning	37	52	74	105
1-03	Diesel-electric	3,234	3,071	6,653	6,379
1-06	Total	3,515	3,456	7,222	7,201
2	Passenger yard switching hours (000):				
2-01	Steam, coal-burning	9	12	19	27
2-02	Steam, oil-burning	4	4	9	8
2-03	Diesel-electric	230	237	486	504
2-06	Total	268	279	565	595
3	Hours per yard locomotive-day:				
3-01	Steam	4.80	4.90	4.60	4.90
3-02	Diesel-electric	15.50	15.30	15.20	15.10
3-05	Serviceable	15.30	14.60	15.00	14.40
3-06	All locomotives (serviceable, unserviceable and stored)	13.10	12.40	12.90	12.30
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.66	1.73	1.67	1.75
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.77	.76	.76	.76

[1] Excludes B and trailing A units

PERSONAL MENTION

Baltimore & Ohio

FRANCIS B. RYKOSKEY, superintendent of motive power at Pittsburgh, Pa., appointed assistant general superintendent of motive power and equipment, with headquarters in Baltimore, Md. *Education*: St. Bonaventure's Preparatory School; West Liberty State Teachers College (G.A. 1933); University of West Virginia; West Virginia Technical College. *Career*: Started as a machinist helper on B&O in Benwood, W. Va., in 1920. Subsequently became machinist, special inspector, diesel electrical supervisor at Baltimore, enginehouse foreman at Brunswick, assistant division master mechanic, and supervisor of shops at Baltimore. In 1950 appointed superintendent of motive power at Pittsburgh.

Boston & Maine

Mechanical engineering department transferred from Billerica, Mass., shops to the Industrial Building, Boston, where it is located with the Operating-Mechanical Department.

Central of Georgia

WILLIAM H. LEAVENGOOD, assistant mechanical engineer, appointed mechanical engineer at Savannah, Ga. *Education*: University of Florida—M. E. deg. *Career*: Began with the C of Ga in 1948 as mechanical draftsman. Appointed assistant mechanical engineer in 1949. A registered professional engineer in State of Georgia.

SIDNEY L. WALDHOUR, chief fire inspector, appointed research and test engineer, with headquarters at Savannah, Ga.

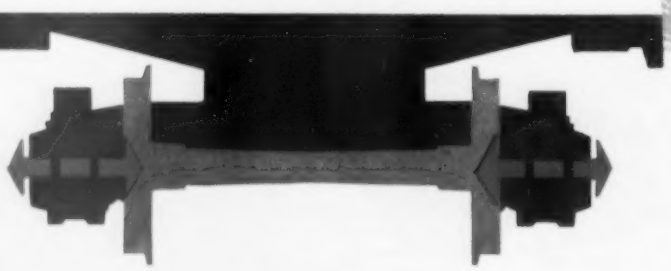
AAR accelerometer tests prove cars ride better with

FREE LATERAL

In the official AAR accelerometer road tests of various new high-speed freight car trucks conducted in recent years, **trucks equipped with bearings which permit free lateral movement of the journals consistently showed lower lading damage index ratios than the same trucks did when equipped with bearings which restrain lateral movement.**

It's a matter of record—free lateral substantially reduces wear and tear on wheel flanges, trucks and cars—cuts lading damage, too!

If you want the *full advantages* and *maximum economy* roller bearings can give you, don't be penalized by sacrificing free lateral. *Insist on* Hyatt Roller Bearing Journal Boxes.



HYATT

ROLLER BEARING JOURNAL BOXES

RUNNING MATE OF FASTER FREIGHT

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

THE NEW IMPROVED TIREX CORD

NOW is easier to handle than ever before . . .
because of the great increase in its flexibility

NOW is able to remain pliable in even colder weather . . .
because of its improved flexibility at low temperatures

NOW is extra tough and smooth . . .
because of its improved Selenium Neoprene Armor compound that is cured in lead

This increases TIREX's resistance to snagging and tearing on sharp corners even more.

Simplex TIREX

For detailed information as to how the NEW, IMPROVED TIREX CORD can save time and effort for *you*, and cut down *your* maintenance costs, write to the address below for Folder 1022.

SIMPLEX WIRE & CABLE CO.
79 Sidney Street, Cambridge 39, Mass.

PERSONAL MENTION

(Continued from page 9)

Erie

FRANCIS P. LAWLER, diesel training instructor, has retired.

HAROLD C. WHITFORD, assistant supervisor of motor equipment, has been appointed to the newly created position of diesel maintenance instructor.

Norfolk & Western

W. B. STEVENS, gang foreman, electrical department, Roanoke, Va., shops, has retired.

H. J. CLENDENEN, gang foreman—electrical at Roanoke, Va., passenger station, appointed gang foreman, electrical department, Roanoke shops.

T. L. TAYLOR, gang leader at Roanoke, Va., shops, appointed gang foreman—electrical at Roanoke passenger station.

Pennsylvania

W. C. FLECK, master mechanic, Philadelphia Terminal and Atlantic Divisions and P.R.S.L., appointed assistant to engineer of tests at Altoona, Pa.

J. C. WHITE, master mechanic, Lake division, appointed master mechanic, Philadelphia Terminal and Atlantic Divisions and P.R.S.L.

W. H. LONG, assistant master mechanic, Altoona, Pa., Middle Division, appointed master mechanic, Lake Division.

W. H. MILLER, foreman, Richmond, Ind., enginehouse, appointed assistant master mechanic, Altoona, Pa., Middle Division.

J. K. MCNEAL, III, foreman, Atlantic City enginehouse, appointed foreman, Richmond, Ind., enginehouse.

H. W. WITTMAN, assistant foreman, Paoli, Pa., car shop, Philadelphia Terminal division, appointed foreman, Atlantic City enginehouse.

F. K. NIELSEN, gang foreman, special duty, office of general superintendent motive power, Eastern Region, appointed assistant foreman, Paoli, Pa., car shop, Philadelphia Terminal division.

H. L. WOOD, assistant master mechanic, Philadelphia division, appointed assistant master mechanic, Pittsburgh and Conemaugh divisions.

Southern

Washington, D. C.

E. W. PREBLE, assistant shop engineer at Washington, appointed mechanical engineer.

OLIVER H. SMART, JR., appointed assistant shop engineer.

ROBERT F. REUBUSH, JR., appointed assistant shop engineer.

J. B. Rykoskey (B&O)

THOMAS L. SYKES appointed tool design engineer.

Atlanta, Ga.

EUGENE JARRELL appointed foreman electricians.

W. H. Leavengood (CofGa)

CLIFFORD S. SMITH, JR., appointed assistant foreman electricians.

WILLIAM J. PURDIE, JR., appointed assistant foreman roundhouse.

LESTER R. REDDY appointed foreman car inspectors.

SUPPLY TRADE NOTES . . . . . .

GUSTIN-BACON MANUFACTURING COMPANY.—*D. M. Vance* has been appointed to the sales force in the Chicago area. Mr. Vance was previously with the Nathan Manufacturing Company.

■

ALLIS-CHALMERS MANUFACTURING COMPANY.—*Robert S. Stevenson*, executive vice-president, has been elected president, succeeding *William A. Roberts*, deceased.

■

LUNKENHEIMER COMPANY.—*Melvin W. Pauly*, general sales manager, has been elected vice-president, sales.

■

SKF INDUSTRIES, INC.—SKF has acquired the controlling interest in *Tyson Bearing Corporation*, Massillon, Ohio, manufacturers of tapered roller bearings. Operations will continue under direction of the existing management, headed by *Harry I. Lewis*, president.

■

JOY MANUFACTURING COMPANY.—*Donald L. Archibald* has been appointed district sales manager, New England area, with headquarters in Boston. Mr. Archibald had been previously located at St. Louis.

■

ALCO PRODUCTS, INC.—The name of the *American Locomotive Company* has been changed to Alco Products, Inc., to reflect the diversified operations of the company.

William A. Powers has been appointed regional service manager and *C. S. Middleton*, renewal parts sales representative, both in the Chicago sales district.

■

BEAVER PIPE TOOLS, INC.—*Ned Dengler*, has been appointed district manager of sales in Southern Ohio, Indiana, West Virginia and Kentucky, with headquarters at Fremont, Ohio.

■

ARMSTRONG CORK COMPANY—The full line of Fiberglas industrial insulations manufactured by the *Owens-Corning Fiberglas Corporation* will also be produced for Armstrong Cork who will market them under the trade name "Armaglas."

■

LINCOLN ELECTRIC COMPANY.—*L. K. Stringham*, chief engineer, has been appointed vice-president in charge of engineering. *George Landis*, engineering vice-president, has been appointed vice-president in charge of research. *Norman J. Hoenie* and *Emmett Smith* have been appointed chief engineer, respectively, of the Machine and Electrode Divisions, of which they had previously been assistant chief engineers.

■

CLIMAX MOLYBDENUM COMPANY.—Climax has established three new divisions, including direct sales, metallurgical market development, and chemical market development. *Lars E. Ekholm* has been appointed manager of the sales division and *Norman L. Deuble*, manager of the metallurgical division, both with headquarters in New York. Diesel and other engines, gas turbines, and railroad equipment will be in a group under the metallurgical market development division. This group will be located in Chicago.

■

UNION CARBIDE & CARBON CORP.—New research laboratories, to be managed by the National Carbon Company, a division of Union Carbide & Carbon, are being built at Parma, Ohio, a suburb of Cleve-

(Continued on page 102)

the Original snubber spring

Holland Volute Snubber Springs are NOT miniature Draft Gears. They are effective Load-Carrying SPRINGS as well as highly efficient FRICTION SNUBBING DEVICES for Freight Cars.

Either 1⅛" or 2½" Spring Travel

They are easily applied by simply removing one standard Bolster Spring from each spring nest, and replacing it with a Holland Volute Snubber Spring.

HOLLAND A-7-A VOLUTE BOLSTER SPRING

Write for New Bulletin #15A describing in detail the Unit Snubber.

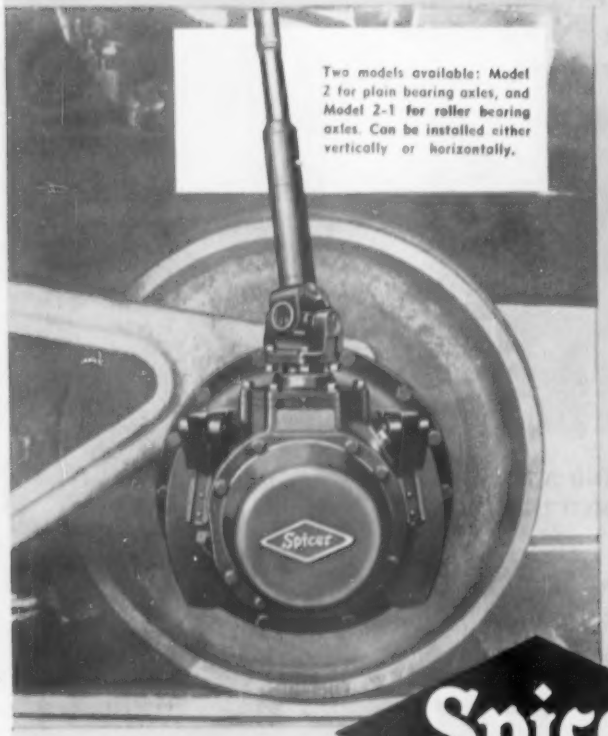
HOLLAND COMPANY

332 S. MICHIGAN AVE. CHICAGO 4, ILLINOIS

38RR

Two-way Radio -

another way to increase railroad efficiency with the new Spicer



Two models available: Model 2 for plain bearing axles, and Model 2-1 for roller bearing axles. Can be installed either vertically or horizontally.

½ TO 5 KW POSITIVE GENERATOR DRIVE

Instantaneous communication between front and back . . . this is the answer to many freight train problems . . . and the answer is two-way radio made possible by steady, ample electrical current powered by the new Spicer ½ to 5 KW *Positive Gear* Generator Drive!

Two-way radio reduces delays and tie-ups due to mechanical troubles. There is less cargo damage or spoilage. No "lost" trains . . . the dispatcher always knows where his trains are. Changes in train orders can be given before arrival at destination. Less time and motion is lost. Greater safety for train and crew is assured at all times. Operating situations for all trains in a 25-mile radius can be inter-communicated for the benefit of all.

This new Spicer Generator Drive fills a long-felt need for a small, low cost, positive drive to supply power for the smaller generators. It is a simple, light weight, efficient drive, designed especially for use with two-way radio, lighting and other electrical equipment on caboose, baggage, mail and refrigerator cars.

Write for illustrated bulletin No. 323 giving complete details of the new small ½ to 5 KW Spicer Generator Drive.

Spicer

DANA CORPORATION Toledo 1, Ohio

Elastic Stop nuts were specified in 1949 to provide safety and low-cost fastening on the DL&W's famous Phoebe Snow.

Five years of high-speed passenger service confirms low maintenance cost of Elastic Stop® nuts

Holding fast despite vibration on shock absorber mountings . . . draft gear carriers . . . slack adjusters . . . brake cylinders . . . spring equalizer seats and pedestal tie bars, self-locking Elastic Stop nuts cut maintenance costs substantially on the DL&W modern Phoebe Snow passenger unit. Performing without failures for the past five years they eliminated the need for constant inspection and retightening. Easily removed without damage to bolt threads they can be re-used through many on-off cycles without loss of effectiveness.

Mail the coupon for detailed information on new, vibration-proof Elastic Stop nut fastening methods for locomotives, passenger and freight car applications.

ELASTIC STOP NUT CORPORATION OF AMERICA

ESNA® TRADE MARK / ROLLPIN TRADEMARK

Elastic Stop Nut Corporation of America
Dept. N68-623, 2330 Vauxhall Road, Union, N. J.
Please send the following free fastening information:

☐ ELASTIC STOP *nut* bulletin

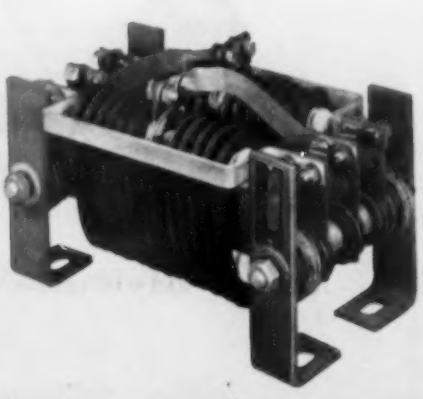
☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name _____ Title _____
Firm _____
Street _____
City _____ Zone _____ State _____

2 G-E RECOMMENDED CARBON BRUSHES are selected for the proper degree of hardness and grain structure to minimize wear and provide correct commutation.

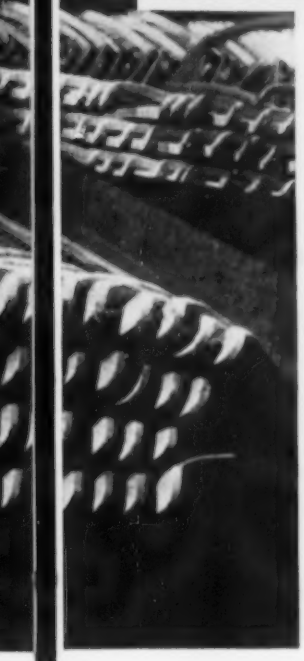
3 G-E MOTOR SUSPENSION BEARINGS give long life—have an oil-return feature which can save up to $85.00 per locomotive unit annually.

4 G-E RESISTORS have floating steel backbones that expand and contract freely with high-temperature changes and therefore are not affected by buckling forces.



7 G-E replacement parts for better locomotive operation

1 LONG-LASTING COILS with new mica mat insulation are assured by a special manufacturing process developed by General Electric. Continuous research during more than 50 years of locomotive manufacture makes G-E renewal parts your best buy.



To assure you of longer armature life . . .

G-E coils are tested at 5500 volts

When you buy rewind kits for your Type GE-731 and GE-752 traction motors, the most important thing to consider is the quality of the armature coil that is included. Proper insulation is a major factor in long coil life. That's why GE-731 and GE-752 rewind kits with their mica mat insulated coils are your best buy. To assure you of the quality of these coils, G.E. submits them to a high-potential test of 5500 volts to ground. This is 5½ times the rated operating voltage of the coil, and is the highest production test voltage used in the industry. This electrical strength is made possible by G.E.'s new mica mat insulation.

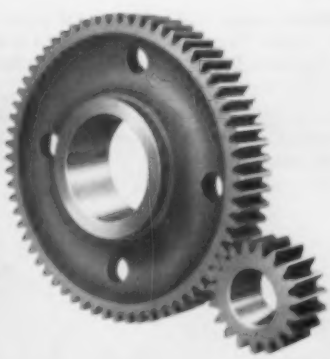
Mica mat is a high-temperature, high dielectric material made by a special process. Compared to conventional mica, it has the advantage of dimensional stability and controlled uniform thickness. Because of this uniformity, G-E coils fit smoothly in their slots—not too tight, and not too loose. The result—more miles between rewinds for your traction motors. To get the best rewind kits for your money, always specify genuine G-E armature rewind kits. General Electric Co., Locomotive & Car Equipment Dept., Erie, Pa. 128-22

Progress Is Our Most Important Product

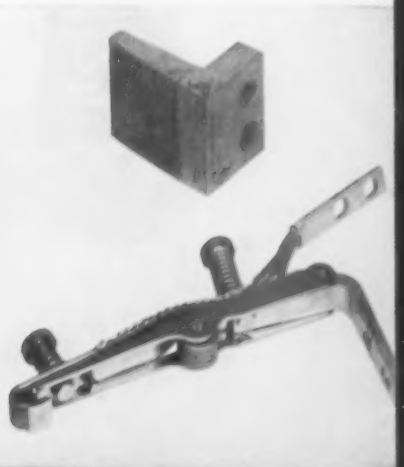
GENERAL ELECTRIC

5 G-E COMMUTATORS retain smoothness in service because a high-speed, high-temperature seasoning process sets segments firmly in place.

6 G-E GEARING is designed and quality-control manufactured to carry the heavy starting loads and take the running shock loads encountered in today's railroad service.



7 G-E CONTACT PARTS break circuits quickly with a minimum metal transfer—assuring long service life.



6 major railroads installing NMB Sealed Journal Box Kits

"Patented" and "Patents Pending"

PROVE TO YOURSELF, ON YOUR RAILROAD

that the NMB Kit can effect these vital operating benefits:

MAKE THIS SIMPLE TEST

Equip 10 solid bearing cars with NMB Kits. This will cost about $232. per car. Operate cars under all possible conditions. We predict bearing end wear will be cut to an almost unbelievable 0.0006" per 1,000 car miles. Inspection will be needed only once a month. Oil consumption will drop to about 1 oz. per 1,000 journal box miles.

These predictions, amazing though they may seem, are based on the experience of 8,000,000 journal box miles of operation of the Kits by Class I railroads.

This same operating experience shows NMB Kits pay for themselves in 18 months, and thereafter save $6.88 per 1,000 car miles.

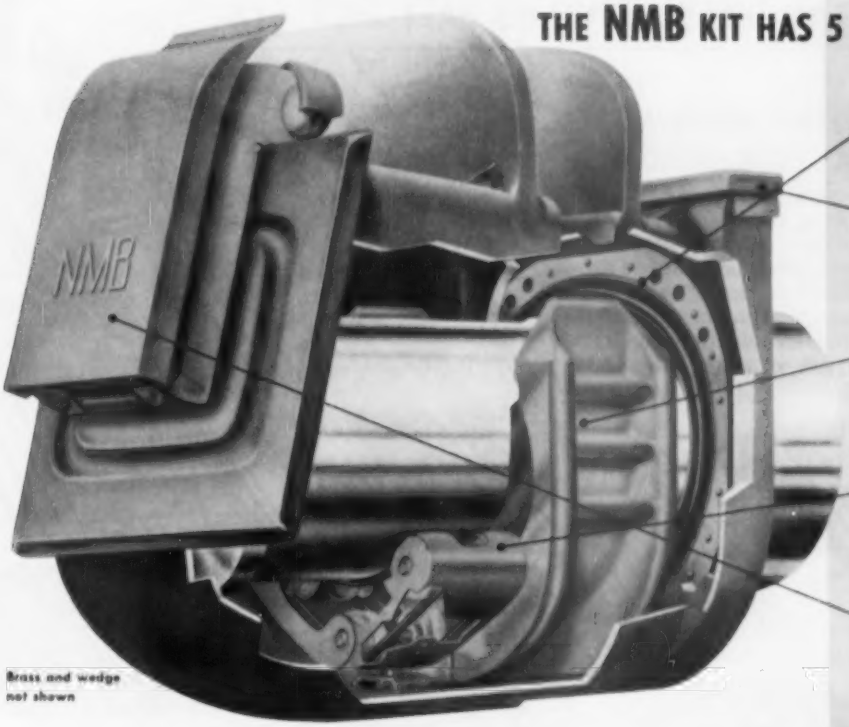
- **PRACTICALLY ELIMINATES BRASS END WEAR**
- **81.4%* ELIMINATION OF HOT BOXES**
- **90% LESS OIL CONSUMPTION**
- **90% LESS INSPECTION TIME**
- **ELIMINATION OF VIRTUALLY ALL ACCIDENTS DUE TO HOT BOXES**

WM. G. RINGLAND, former Assistant Superintendent of Equipment, New York Central System and now Eastern District Manager, Railway Equipment Division, National Motor Bearing Co., Inc., says:

"In my 40 years of railroad experience, this is the first time I have seen a practical, economical device that licks the hot box problem for solid journal bearings."

A.A.R. Approved for Interchange Service on 10,000 Cars

THE NMB KIT HAS 5 PRINCIPAL PARTS



Brass and wedge not shown

A. OIL SEAL. Keeps oil in; dirt, water, brine and snow out.

B. DUST GUARD WELL COVER and FILTER. Exclude dripping water, snow, brine; yet permit breathing.

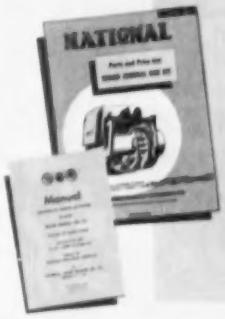
C. JOURNAL GUARD BEARINGS. Eliminate axle damage during humping, coupling, starting or heavy braking.

D. OIL CIRCULATOR. Lubricates bearings with ½ turn of axle. Guarantees continuous lubrication. Bearings run 50° cooler.

E. JOURNAL BOX LID and WAFFLE GASKET. Provide tight oil and water seal at front opening. Eliminate vibration wear.

The NMB Sealed Journal Box Kit is the result of applying modern automotive engineering principles to a century-old railroad problem. Developed by NMB in collaboration with 3 major western railroads, the NMB Kit is a modern, sealed oil bath lubrication and dirt exclusion system for solid bearing journal boxes.

Installation is made in the regular standard A. A. R. journal box; no alteration is required. Waste packing normally used for lubrication is removed. NMB Kits for 5" x 9", 5½" x 10" and 6" x 11" A. A. R. standard solid bearing journal boxes are available.



NEW MANUAL describes simple, inexpensive installation steps. **PARTS & PRICE LIST** shows all Kit parts, gives quantity purchase discounts. Sent immediately without obligation.

For complete information or consultation at your headquarters, write or telephone NMB Railway Equipment Division offices listed below.

NATIONAL
OIL & GREASE SEALS
O-RINGS SHIMS

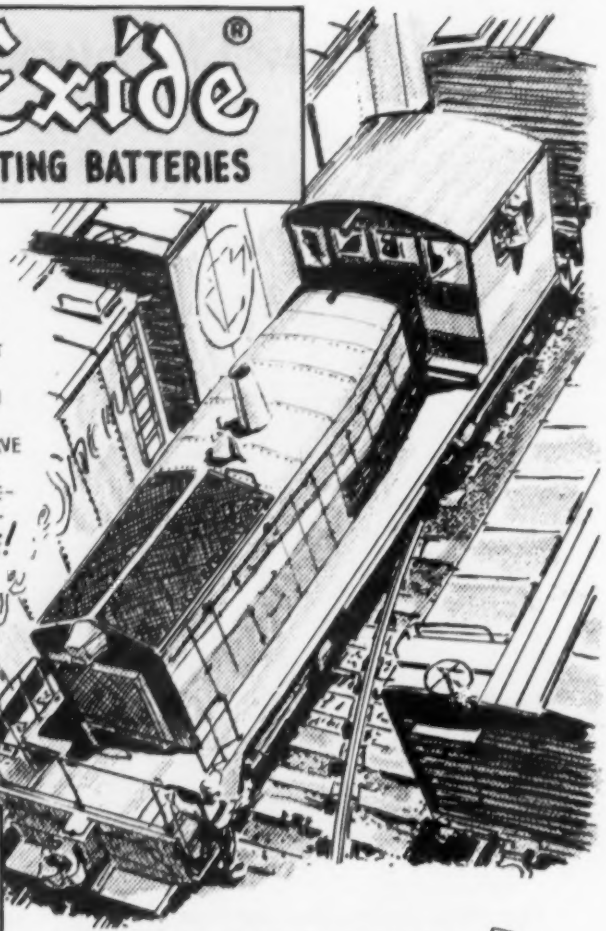
NATIONAL MOTOR BEARING CO., INC.

GENERAL OFFICES: Redwood City, California
PLANTS: Redwood City, Downey and Long Beach, California; Van Wert, Ohio
RAILWAY EQUIPMENT DIVISION OFFICES
New York 17, N. Y.: Room 537, 527 Lexington Ave. PLaza 3-6647
Chicago 3, Illinois: Room 4113 Field Bldg., 135 S. LaSalle St. FRanklin 2-2847
Redwood City, California: Broadway at National Ave. EMerson 6-3861

NMB has manufactured tens of thousands of oil seals for roller bearing cars and over 1,000,000,000 oil seals for AUTOMOBILES • TRUCKS • TRACTORS • AIRCRAFT • MACHINES • HOUSEHOLD APPLIANCES

*Based on operating experience of major Class I railroads.

FACTS ABOUT Exide®
IRONCLAD® DIESEL STARTING BATTERIES



EFFICIENT FREIGHT HANDLING STARTS WITH DEPENDABLE EXIDE-IRONCLADS!

SMOOTH, PROFITABLE FREIGHT MOVEMENTS DEPEND UPON EQUIPMENT ALWAYS READY TO ROLL. EXIDE-IRONCLAD DIESEL STARTING BATTERIES ASSURE QUICK BREAKAWAY AND FAST ACCELERATION OF ENGINE TO FIRING SPEED. THEY RESPOND INSTANTLY TO ALL POWER DEMANDS - LARGE OR SMALL... THEY PROVIDE AMPLE RESERVE POWER FOR POSITIVE OPERATION OF ALL CONTROL EQUIPMENT. LOW OPERATING COSTS AND EXCEPTIONALLY LONG LIFE MAKE EXIDE-IRONCLAD DIESEL STARTING BATTERIES, YOUR BEST POWER BUY—

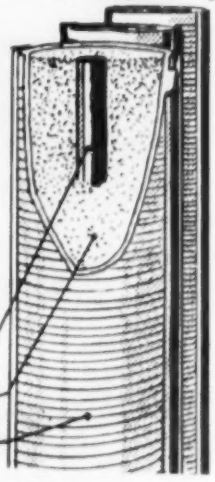
AT ANY PRICE!

EXIDE-POWERED DOODLEBUG *SPEEDS SHOP REPAIRS!*

AT NEW YORK CENTRAL'S NILES, MICH., REPAIR SHOP THEY BUILT THIS IRONCLAD-POWERED "DOODLEBUG" TO MOVE SWITCHERS AROUND THE SHOP. THE "ENGINEER" KEEPS A FINGER ON THE CONTROL BUTTON — WALKS ALONGSIDE HIS POWERFUL, NOISELESS, FUMELESS HELPER. WHATEVER THE RAILROAD JOB (STARTING OR MOVING DIESELS), EXIDES CAN DO IT BETTER, MORE DEPENDABLY.

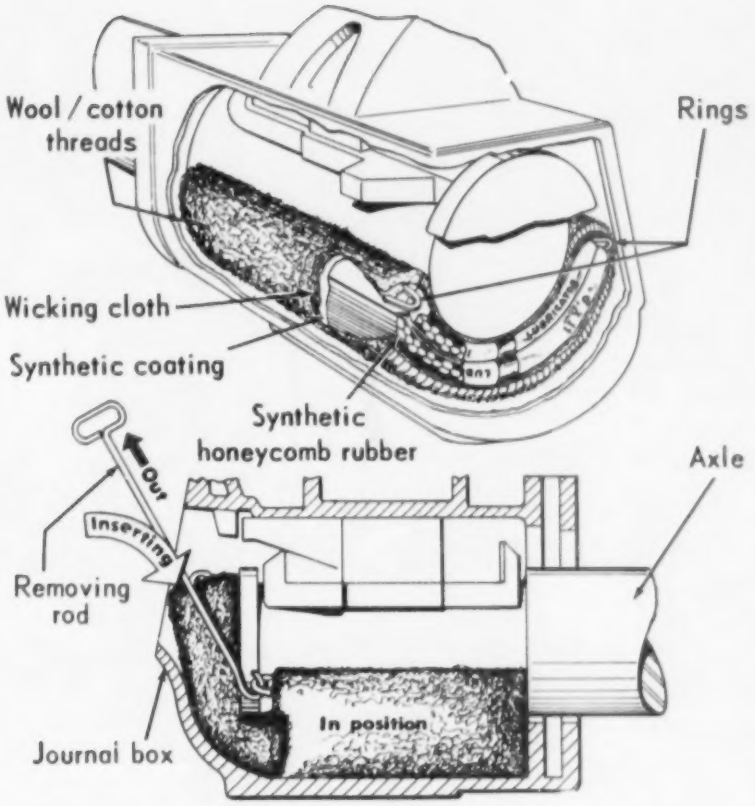
TUBES OF POWER *GIVE IRONCLADS LONGER SERVICE LIFE!*

FINELY SLOTTED TUBES INSIDE AN IRONCLAD KEEP THE ACTIVE MATERIAL IN FIRM CONTACT WITH THE CONDUCTING GRIDS OF THE POSITIVE PLATE. THUS, THE GRID IS PROTECTED... THE ACTIVE MATERIAL IS KEPT IN CONTACT WITH THE GRID LONGER... *THE BATTERY'S WORK LIFE IS LENGTHENED.* THE SLOTTED TUBES ALSO EXPOSE MORE ACTIVE MATERIAL TO THE ELECTROLYTE... *FOR GREATER POWER!* RESULT: THE IRONCLAD'S ABILITY TO DO A DEPENDABLE JOB FOR A LONGER PERIOD OF TIME.



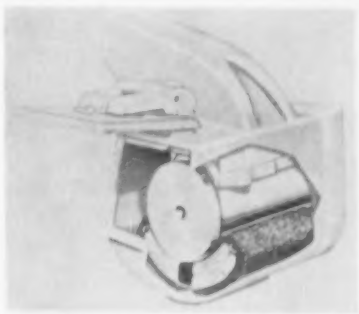
LET EXIDE HELP SOLVE YOUR DIESEL STARTING BATTERY PROBLEM. ❶ CALL AN EXIDE SALES ENGINEER FOR FULL DETAILS. ❷ WRITE FOR FORM 4843 - ALL ABOUT MAINTAINING AND INSTALLING DIESEL STARTING BATTERIES.

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.



Special rings are permanently attached to the lubricator so that it can be removed by a hooked rod

The lubricator pad can be inserted into the box without removing the wedge or brass nor jacking the box



The lubricator stays in place by its own spring-like action, and it can be turned upside down when the journal side wears out

Pad-Type Journal Box Lubricator

After two years of testing and modifying their new muff-type lubricator pad which substitutes for the waste in the journal box, the Miller Lubricator Company has released information on how the device works and how to service it.

The lubricator utilizes the principle of textile wick-action in supplying lubricating oil to car journals. It consists of a thick textile-faced blanket surrounding a canvas-covered springy synthetic rubber honeycomb core. Application does not require modification of existing journal boxes, jacking nor any special equipment.

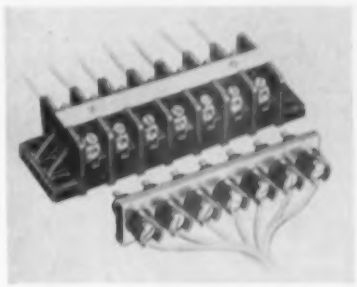
When placed in the journal box, the lubricator's textile blanket is immersed in oil at the bottom of the journal box, while the upper textile face is held firmly against the rotating journal by the spring-like support of the inner rubber honeycomb. Because loose waste is eliminated, the possibility of waste-grab, one of the frequent causes of hot boxes, is avoided.

Also eliminated is the danger of non-lubrication due to lack of sufficient waste, or waste that has slipped out of contact with the journal. So long as there is any oil present in the journal box, the textile blanket-facing of the lubricator exerts a wick-like action, drawing oil to its top side, with a wide, uniform area applying the oil to the journal.

The lubricator is expected to give a total service life of six years. One side will be next to the journal for the three years of the first re-pack period. As the device is identical on the top and bottom, it can be turned upside down for another three year's service.

Some oil savings are expected over the use of waste because, after application, only 5 lb oil need be added to the box in place of the usual 9 lb.

The AAR has approved use of the Miller Journal Lubricator for a 36-month re-pack period, on a limited number of cars, subject to the requirement that, for the present, inspection be made at the expiration of 18, 34 and 30-month intervals. *Miller Lubricator Company, Winona, Minn.*



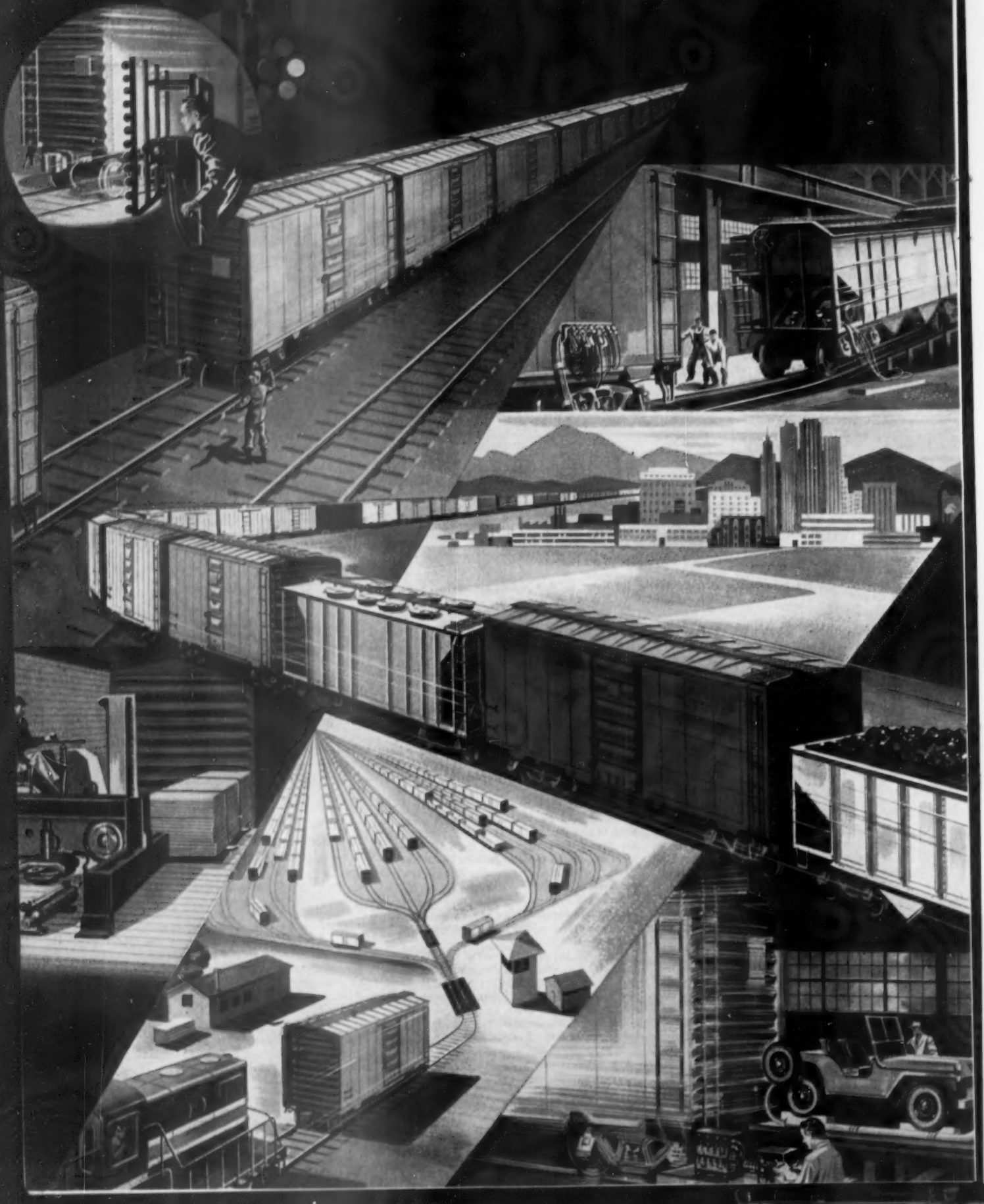
Plug-In Terminal Blocks

This multi-contact plug-in results from the combination of a Curtis Type FTLP terminal block and a Type RH block. Usage of these standard high-current blocks offers three advantages over the conventional type of multi-contact plug-in.

The manufacturer claims that it provides high pressure solderless anchoring of each individual connector for a positive low-resistance contact. The white marker strip on the RH block offers quick,

(Continued on page 24)

Stamina and economy are born



in a laboratory reproduction

of the

GREAT AMERICAN RAILWAY
System

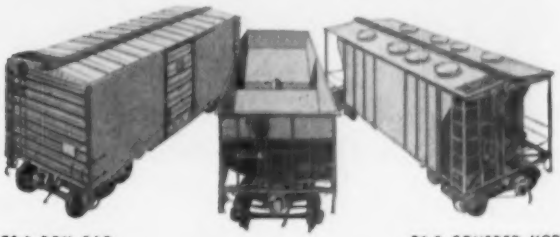
You could, simply by standing in Pullman-Standard's Research and Development Laboratory, give a blow by blow account of the daily life of a freight car operating anywhere on the Great American Railway System.* For here are reproduced the forces created by switching and humping, the vibrations caused by oscillating and shaking and the stresses traceable to heavy loads and shifting ladings.

These and other destructive effects of normal operation are measured by scores of scientific devices such as strain gauges, ocillographs and high speed movie cameras. It is only by means of such data that the clues to design problems can be found, that the cost and weight penalties of construction which exceeds a reasonable safety factor can be avoided.

The stamina and life-time economy of the PS-1 Box Car were created in the laboratory. And the "on line" inspection of representative numbers of the 57,000 now in use, verifies it. The PS-2 Covered Hopper and the PS-3 Hopper Car also have designed- and built-in stamina balanced with economy, as a result of this laboratory reproduction of operating conditions. All three are quality cars built to earn more ton miles of revenue at lower cost per year of service, wherever they are sent.

*A typical box car moves, in one year, on 39 different roads, including two or more trips on 24 roads. (A. A. R. data)

Built to serve best on the
GREAT AMERICAN RAILWAY SYSTEM



PS-1 BOX CAR

PS-3 HOPPER CAR

PS-2 COVERED HOPPER

YOUR NEEDS CREATE THE PULLMAN "STANDARD"

PULLMAN-STANDARD

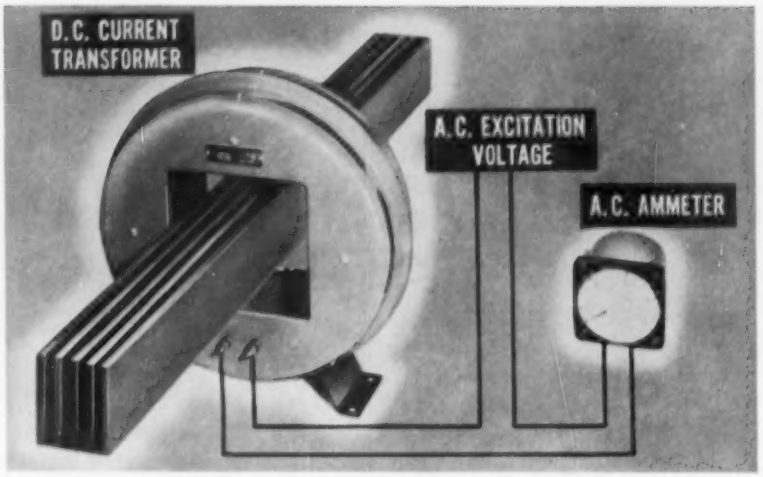
CAR MANUFACTURING COMPANY
SUBSIDIARY OF PULLMAN INCORPORATED
79 EAST ADAMS STREET, CHICAGO 3, ILLINOIS
BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

(Continued from page 21)

convenient identification of circuits. A simple means of making any of multiple contacts without the high cost or a large stock of plugs is also claimed.

The FTLP block was designed for subpanel and chassis connections where a soldered connection is desired. It is available factory assembled in any specified number of terminals from 1 to 16 and has ample clearance and leakage distances for use in circuits carrying up to 300 volts, 20 amp.

The RH block, serving as the female connector was designed for high-pressure solderless connections. It is factory assembled in any number of terminals from 1 to 20 and is rated at 750 volts, 50 amp. *Curtis Development & Manufacturing Co., 3266 North 33 Street, Milwaukee 16, Wis.*



D-c Current Transformer

The d-c current transformer provides for a permanent remote indication of large d-c currents with an isolated instrument circuit. An open center allows the JSU-1 transformer to be placed over the bus or cable without making contact with the d-c circuit. The unit was formerly designated as the d-c measuring reactor and it consists of a saturable core reactor and an a-c ammeter. An a-c excitation voltage is fed to the transformer and the magnitude of the d-c current is indicated by the variation in the a-c current passed by the transformer.

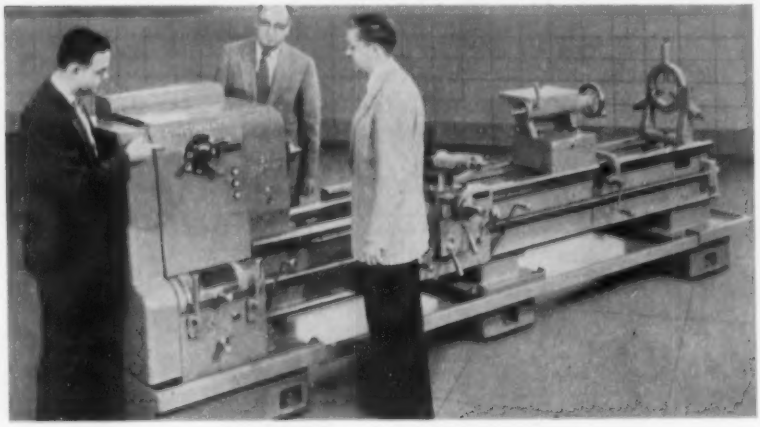
Applications for this device include not only visual indications but feedback sources for current balance regulators, d-c voltage regulators, motor field controls, and diesel-electric locomotive static excitation controls. There is a reduction of electrical hazard to personnel and equipment because the indicating instrument is isolated from the main bus voltage. Installation expense may be decreased because no shunts or special bolted bus connections are necessary. *General Electric Company, Schenectady 5, N. Y.*

Bar Type Puller

Power and versatility feature this industrial puller that provides up to 50 tons of power for machinery jobs. The unit is heat-treated to take the stresses and strains built up in breaking loose and removing rusted-on or tightly fitted gears, pulley wheels or similar objects.

The yoke is machined from 2½-in. square stock and is 16 in. long. Grooves for side rods extend to within a short distance of the center pressure screw so objects can be pulled with openings or tapped holes a minimum of 6 in. apart, center to center.

To make for extra rigidity of the side rods and to make the unit adaptable for pushing and pulling, an extra set of nuts is included which can be threaded on the rods to contact the underside of the yoke. For pulling large spoke wheels, two adapter blocks can be slid over the side rods and held in position by two nuts. This allows the puller to adapt to almost any type of wheel construction. *Snap-on Tools Corporation, Kenosha, Wis.*



Geared Head Tray-Top Lathes

These all-geared Tray-Top toolroom lathes, swinging 21½ in. and 26 in., have 12 spindle speeds in geometric progression, with a 3-lever, color match, direct-reading shift mechanism. The spindle, with long taper key drive nose, is rigidly mounted in three zero position anti-friction bearings. Diameter of the hole through the spindle is 1 13/16 in. for the smaller lathe, with a 2 7/16 in. diameter hole available on demand. The 2 7/16 in. spindle hole is standard for the larger lathe.

All headstock bearings, gears and shafts are pressure lubricated with filtered oil. A total of 54 thread and feed changes are made available through a totally enclosed, automatically lubricated quick change gear box, where a lever to reverse the lead-

(Continued on page 28)

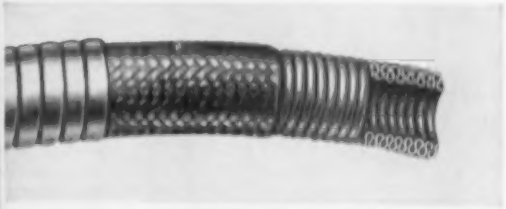
FOR FASTER, EASIER TRAIN SERVICING . . .

Union Station, Washington, D. C., converts to AMERICAN Car Heater Hose

Four years ago the first *American* car heater hose assembly went into service at Union Station. Today, this type of flexible metal hose has replaced all but a few of the old steam line connectors for train servicing in the busy, two-level terminal.

American Car Heater Hose, known as RR-125, has a core of seamless, flexible, corrosion-resistant tin-bronze tubing. Bronze wire braid adds strength . . . outer flexible stainless steel jacket protects against abrasion and wear. Simple to connect and disconnect. No joints to repair . . . no packing to replace . . . positive leakproof service. Saves steam . . . costs far less to maintain than swing-joint assemblies or any other connector. Fittings can be used over and over again.

American Flexible Metal Hose and Tubing is widely used by railroads for many applications. The complete line is described in Bulletin CC-400. For a free copy, write to *The American Brass Company, American Metal Hose Division, Waterbury 20, Conn.*



Rugged . . . flexible. Core of seamless tin-bronze tubing covered with tin-bronze wire braid for extra strength. Outer armor of stainless steel flexible hose.

WHEREVER CONNECTORS MUST MOVE

AMERICAN

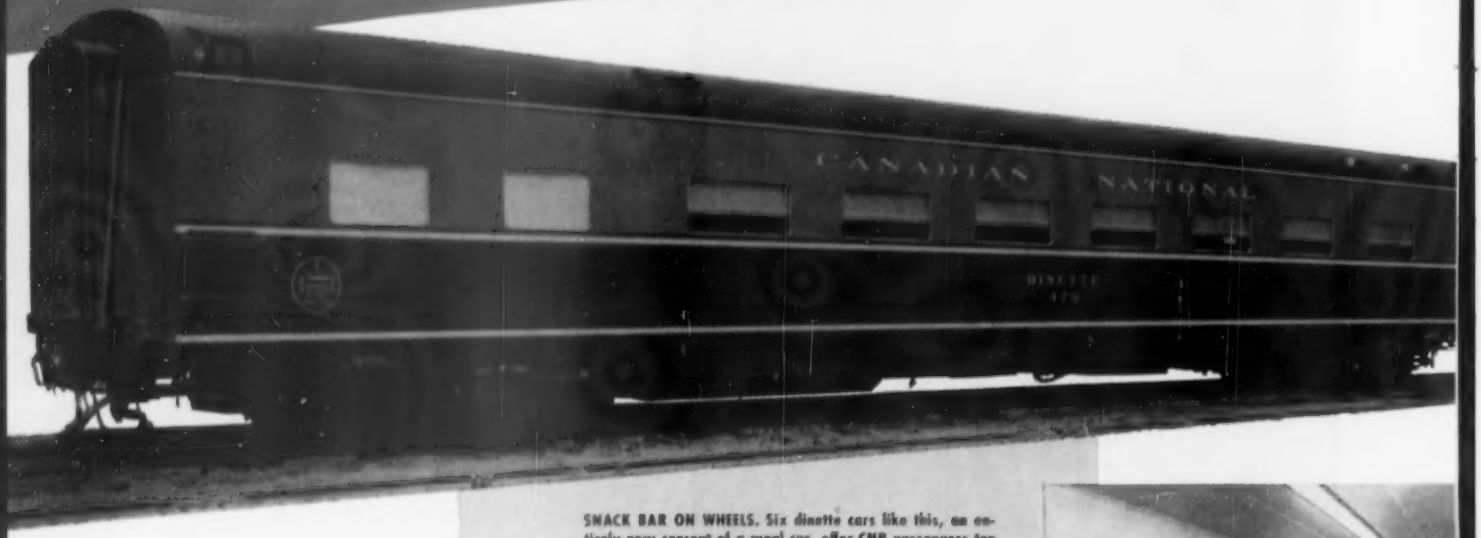
flexible metal hose and tubing

an **ANACONDA**® product

Worker connects standing train to steam main with American Car Heater Hose at Washington's Union Station. Note how flexible metal hose bends to make handling easier.

UNITED STATES STEEL
USS HIGH STRENGTH STEELS
TWENTY-TWO YEARS OF PERFORMANCE

6,388 passenger cars have been built

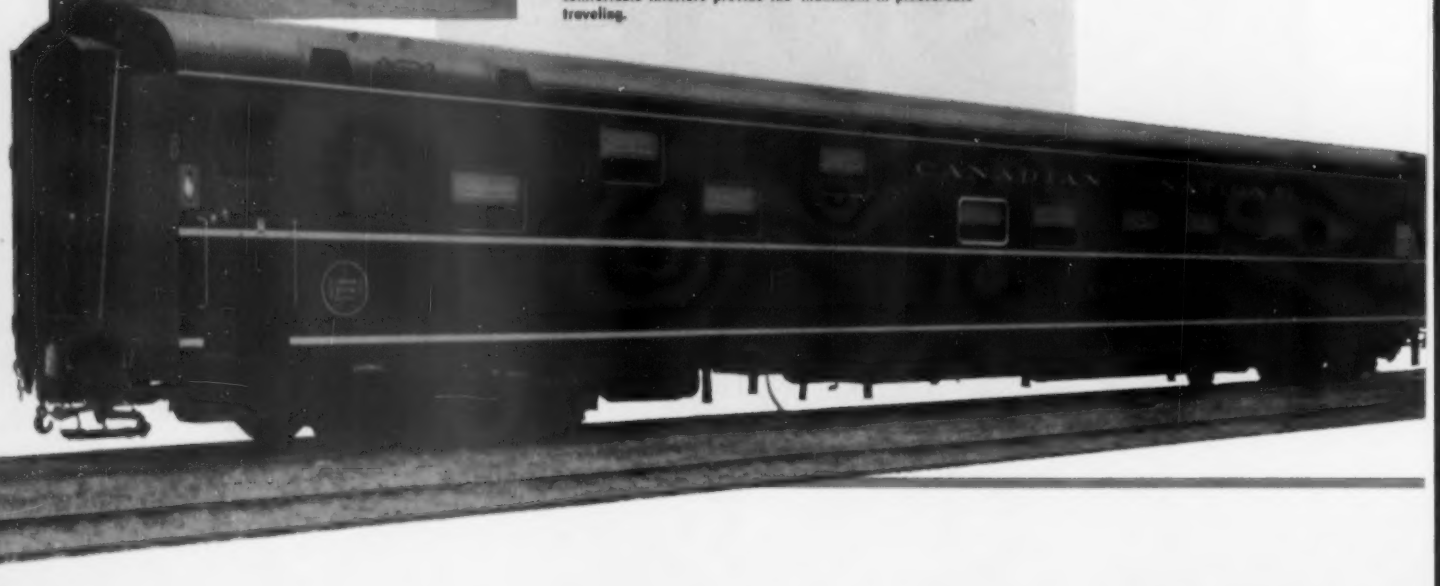


SNACK BAR ON WHEELS. Six dinette cars like this, an entirely new concept of a meal car, offer CNR passengers top quality food—everything from a light snack to a full-course meal—at prices that will fit the pocketbook of the most budget-minded passenger.

Seating 76 passengers, these handsome, air-conditioned cars were built by Pullman-Standard at its Chicago plant, Pullman Car Works, to a design created jointly by the CNR and the carbuilder. A feature of the car-length counter is a convenient under-the-counter purse shelf, and seats that as one person puts it, "are very comfortable being wide enough to take even a middle-age spread." Antique gold monotone photo-murals add a striking note to the car's decor.

EN SUITE EN ROUTE. In this Pullman-Standard car, one of 52 sleepers having the 4-4-8 arrangement—four open sections, four double bedrooms, eight duplex roomettes—a feature now to CNR passengers is the bedroom "en suite" arrangement. By folding the separating partitions into the pocket reserved for it, two rooms can be opened into one. This permits making up the two lowers as twin beds, particularly desirable when families with small children travel.

Like all the cars on this new CNR order, these cars are the latest word in functional design. Their smartly styled and comfortable interiors provide the maximum in pleasurable traveling.



better with USS COR-TEN steel since 1933

359 NEW PASSENGER CARS FOR CANADIAN NATIONAL

CANADIAN NATIONAL RAILWAYS

BUILT WITH USS COR-TEN STEEL

to provide greater safety and durability with lighter weight

● These new cars, 141 sleepers, diners and dinettes built by Pullman-Standard, and 218 modern streamlined coaches produced by Canadian Car and Foundry, represent an expenditure of $59 million dollars—the largest order ever placed in one year by one road on the North American continent.

With these cars, which emphasize passenger comfort and convenience, Canadian National is modernizing all its main-line passenger trains from coast to coast. Their addition to the CNR system brings the number of passenger cars, built lighter, stronger and longer lasting with USS Cor-Ten Steel and owned by this road, to a total of 886—the largest number of Cor-Ten-built passenger car units operated by any single railroad.

The first Canadian National passenger cars built better with USS Cor-Ten Steel by Canadian Car and Foundry were put into service in 1938. This order consisted of 50 streamlined, air-conditioned coaches in which 26,300 pounds of dead weight were trimmed off the body structure of each car by careful design and by taking advantage of the high strength and high corrosion resistance of Cor-Ten Steel.

As a result of the excellent performance and economic advantages demonstrated by this original equipment, 377 additional units were added through the years, and "high strength steel construction" was specified by Canadian National when they placed the orders for the 359 cars delivered recently. We believe these facts speak for themselves.

* * *

Since 1934, some 6388 passenger cars built with USS Cor-Ten Steel have been put in service by 52 railroads in the United States and Canada.

The ability of this equipment to attract passenger traffic, and to keep operating and maintenance costs low are the potent reasons why this superior structural steel is so widely used today in equipment that ranks as the most modern, most efficient and most profitable on the rails. For not only does USS Cor-Ten Steel provide strength, stamina, and durability to a high degree but it lends itself readily to advanced fabricating techniques. In addition, and this is important, the cost of USS Cor-Ten Steel is comparatively low.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

SEE The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

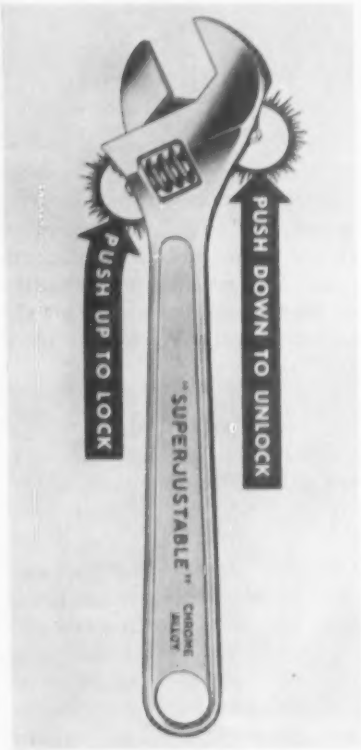
USS

UNITED STATES STEEL

(Continued from page 24)

screw is also incorporated.

The apron is a one-piece casting with automatic lubrication. Longitudinal and cross feeds are engaged with drop levers operating positive jaw clutches. The bedways are ground, and will be flame-hardened on demand. A fully enclosed electrical panel provides a safe and accessible place for power connections. Power is transformed from 220 volts and over to provide only 110 volts at the operator's push buttons. The lathes are offered with a 5 or 7½ hp motor mounted on the rear of the headstock for easy maintenance. Tray-tops on the headstock and tailstock provide a parking place for mikes, tools, drawings, gages and other accessories. *Cincinnati Lathe & Tool Company, Cincinnati 9, Ohio.*



Self-Locking Wrench

The demand for a self-locking adjustable wrench has led to the development of the Superadjustable. The locking feature offers rapid adjustment, positive lock and adequate strength according to the manufacturer. The locking mechanism is small and does not result in a clumsy tool. A flick of the thumb or finger locks or unlocks the adjustment instantly in any position. The wrenches are drop-forged from alloy steel in 8-, 10- and 12-in. sizes with capacities up to 1 5/16-in. *J. H. Williams & Co., 400 Vulcan Street, Buffalo 7, N. Y.*

Dial Saw

The device will cut any size hole from 1-⅛ in. to 3-½ in. diameter in metals, wood, plastics, etc. Its three electronically heat-treated cutting blades adjust simultaneously to the size desired by adjusting the dial. This dial is calibrated in pipe and conduit sizes in addition to ⅛ in. segments.

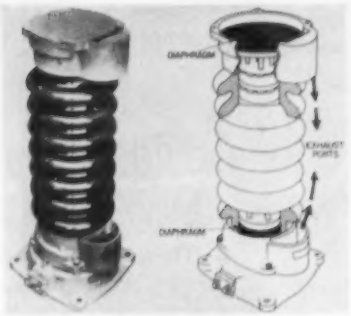
Known as the Model 400, it can be used in tool rooms, model shops, wood and metal working shops, etc. The unit can also be used as a rotary planer, inlaying tool, or grooving tool; cutting any width groove from 1-⅛ in. up. It can be used with hand drills, both manual and electric, drill press, lathe and milling machine.

The saw comes complete with three sets of cutter blades—one set for metal, one for wood, and one for plastic. Cutting depth of the metal cutting blades is ⅝ in., the wood blades is 1 in. Replacement blades are available. *Robertson & Ruth, Box 534, Elmhurst, Ill.*

Retriever

Recovering small parts from hard-to-reach places is aided with the recently developed Proto Grab-All tool. It can retrieve and hold metallic or non-metallic objects and is flexible enough to reach around obstructions. When the cap at the top of the Grab-All tool is pressed, a cable that passes through the outer casing pushes four grippers out of the end. Expanding as they leave the casing, these spring steel grippers can grasp objects of varying sizes. A spring under the cap pulls the cable back into the casing until the grippers hold the object firmly.

Other uses for the Grab-All tool include holding small parts for assembly or for grinding when they are too small or too hot to be held in the hand. The tool is made in lengths of 12, 15, 18 and 24 in. *Plomb Tool Co., Los Angeles, Calif.*



Station-Type Lighting Arrester

The Type SV lightning arrester features a new safety pressure-relief device. Addition of exhaust parts on the arrester makes possible the removal of the source of gas-generation, should the arrester lose its ability to interrupt power flow. The arc is transferred to the outside of the porcelain housing within one-half cycle or less of fault current. This prevents rupture of the porcelain housing by arc-generated gases.

The station arrester is applicable on voltages from 3 to 330 kv. Maximum impulse sparkover values have been decreased for complete line to provide improved equipment protection. *Westinghouse Electric Corporation, Box 2099, Pittsburgh 30.*

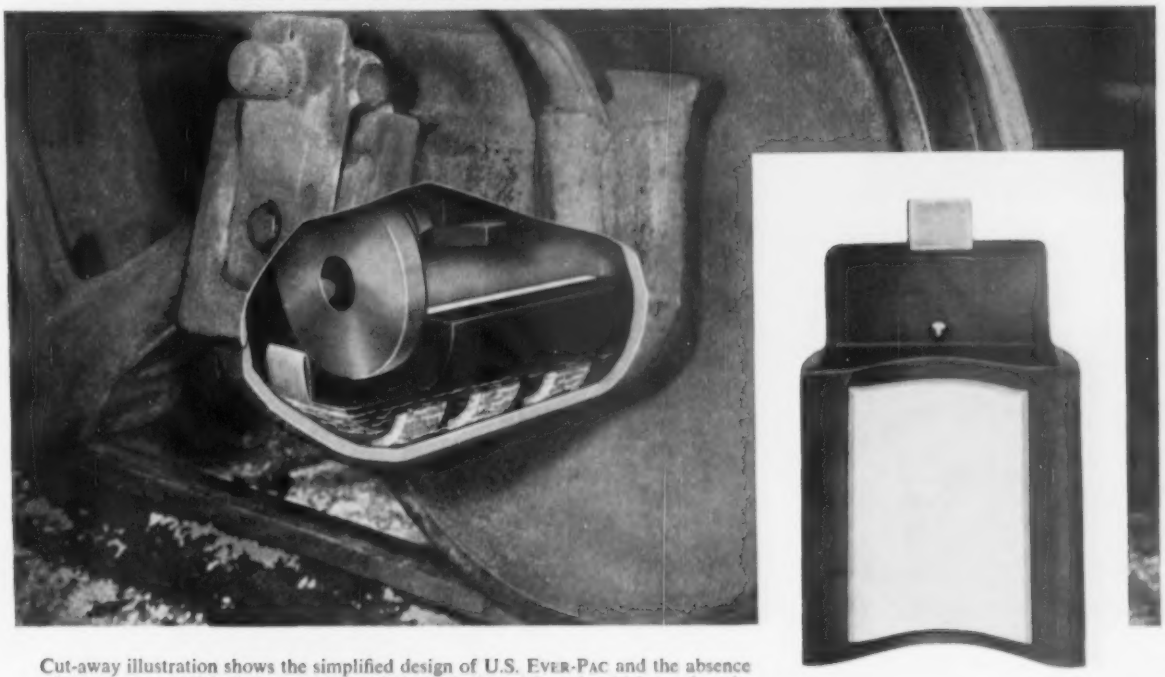
Electrical Insulating Tape

"Scotch" brand electrical tape No. 39 features a pressure-sensitive adhesive that sticks tight on contact with 50 per cent more grab than its predecessor. Its adhesive forms a permanent, solvent-resistant bond after curing. The tape can be utilized in 90 per cent of the holding and insulating jobs in manufacturing and repairing electric motors, coils, transformers and generators.

Shelf life of the tape has been improved considerably while oven cure time remains

(Continued on page 106)

MAJOR CAUSE OF HOT BOXES ELIMINATED!



Cut-away illustration shows the simplified design of U.S. EVER-PAC and the absence of metal parts. Oil is fed to the journal through the wick pad, which receives its supply by capillary action from integral wicks, pumping action, and from the oil-saturated synthetic sponge rubber pad.

U. S. EVER-PAC* solves difficult problem economically.

Here at last is the Journal Lubricator that meets the railroads' chief demand:

Makes "waste-grabs" and other failures of waste packing impossible!

Interchanges with present equipment!
(No shop modifications, machining or additional labor costs)

No costly special oil seals required!

Low-cost initial installation!

Low-cost upkeep!

Easy determination of oil level!

Trouble-free service!

71% of hot boxes are directly attributable to waste packing, mostly "waste-grabs." Ever-Pac makes "waste-grabs" impossible!

U. S. Ever-Pac has A.A.R. approval for application to a specified number of cars which move in general interchange service (Docket No. L-129).

Years of intensive research and testing show conclusively that with U. S. Ever-Pac, a product of United States Rubber Company, a major cause of hot boxes can now be eliminated.

EVER-PAC PROVIDES 3-WAY OIL DELIVERY UNDER ALL ROADBED CONDITIONS AND KINDS OF CAR HANDLING

(1) *Capillary action soaks up oil.* The wick is highly oil-absorbent. There is always a controlled rate of clean oil distribution—because the *yielding* sponge rubber, a specially developed synthetic compound, provides a cushioned *upward* contact.

(2) *Pumping Action.* Each vertical or lateral movement of the journal or journal box compresses the pad, thereby setting up a pumping action which pumps oil from the reservoir under the pad through holes to the distributing wick pad.

(3) *Sponge pad flexing.* Every movement of the journal or journal box flexes the yielding pad, making it "breathe" out even more oil—because the pad contains 2 pints of oil above and beyond the 2 pints in the oil reservoir.

EVER-PAC is easy to install. Simple in design, no metal or complicated parts to get out of order and cause damage. Over 7 years of research and testing prove the dependability and the *economy* of U. S. EVER-PAC. Write for free booklet that gives full details.

***Patented**

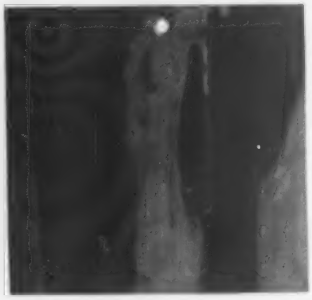
"U.S." Research perfects it... "U.S." Production builds it... U.S. Industry depends on it

UNITED STATES RUBBER COMPANY

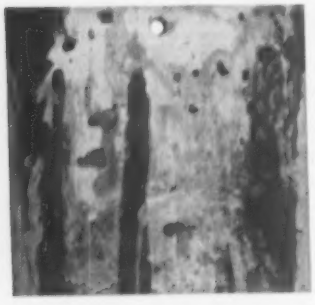
MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes
Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting

Here is a test panel painted by the standard freight car paint system. The paint is on tight... free from blisters or cracks.



The same panel one minute after applying Pennsalt Cleaner 23. The paint is already loosening—even beginning to peel in spots.



Two minutes later. The paint is blistered, has not only been loosened completely, but most of it is ready to sluff away.

Three minutes later, the test is complete. The paint is gone, leaving the bare metal. The surface has rinsed clean...ready for inspection and repainting.

Make the 3-Minute Paint Stripper Test

3-Minute Timer Shows How Pennsalt Cleaner 23 strips paint from a standard freight car panel in 3 minutes . . . leaves bare metal ready for repainting.

Test Pennsalt Cleaner 23 against any other paint stripper you have ever used in your shop. Test it on any paint job, any car going through the line. Time it—and compare speed, completeness, economy.

Pennsalt Cleaner 23 can be applied by the Stripping-Rack Method, the Spot Application Method, or by the Soak-Tank Method.

• **Removes any number of coats of paint**—Pennsalt Cleaner 23 will tackle your heaviest jobs—strip cars and locomotives with 3 coats or 20 on them. This powerful blended alkali compound is ideal for tight production schedules.

• **Saves money**—Economical because it strips clean. Economical because it rinses freely without streaking, or leaving white deposits. *And it costs less than 5¢ a gallon of prepared paint-stripper solution.*

• **Get the complete story**—We'll be glad to send you full information on Pennsalt Cleaner 23—including a free blueprint of a paint stripping rack you can make up in your own shop. Just call the Pennsalt Railroad Service Representative in your area. Or write: Railroad Maintenance, Pennsylvania Salt Mfg. Co. *EAST:* 859 Widener Bldg., Philadelphia 7, Pa. *WEST:* Woolsey Bldg., 2168 Shattuck Ave., Berkeley 4, Calif.

Pennsalt Chemicals

an MF car is a Maintenance-Free car

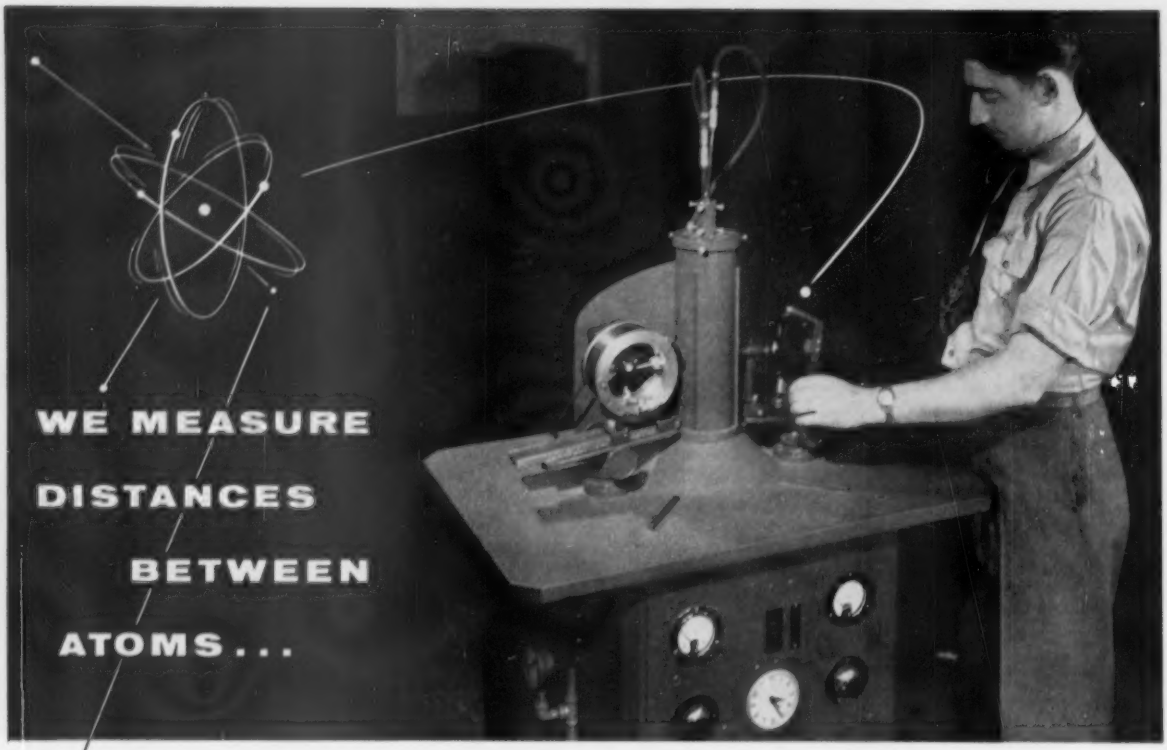
M-F THRESHOLD PLATES

STRENGTHEN THE DOORWAY

PERMIT EASY FLOOR BOARD REMOVAL

MAC LEAN-FOGG LOCK NUT COMPANY

5535 North Wolcott Avenue, Chicago 40, Illinois · *In Canada: The Holden Co., Ltd., Montreal*



TO GIVE YOU *Advance Design* BATTERIES!

The X-Ray Diffraction Unit shown above is one of the few instruments of its kind being used in basic battery research. It identifies complex metallic compounds which cannot be identified practically by chemical means. It does this by actually indicating on film the distances between atoms, enabling Gould engineers to study atomic structure.

This instrument . . . this research . . . is revealing hitherto unknown facts about the relationship between molecular activity and battery performance . . . pointing the way toward more powerful, longer lasting active materials. That's why you get *better* batteries when you buy Gould!

For the full story on Gould Research, send for Booklet 749.

America's Finest!
GOULD
KATHANODE BATTERIES
for Diesel Starting

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GOULD
Batteries

GOULD-NATIONAL BATTERIES, INC.
TRENTON 7, N. J.

"BETTER BATTERIES THROUGH RESEARCH"

Always Use Gould-National Automobile and Truck Batteries

MET-L-WOOD
METAL BONDED TO PLYWOOD

DOORS

★ LIGHT... TOUGH... DURABLE
★ NO THROUGH-BOLTS
NO WARPING
★ NO TWISTING
NO SWELLING

BAGGAGE AND POSTAL CAR DOORS

Completely weatherproof Met-L-Wood doors effectively prevent internal rust and rot... and their tough, smooth surfaces stay new-looking for years. Stainless steel channels along bottom edges of sliding doors are rustproof...virtually wearproof. All-rubber window sash installed or removed in minutes... rattleproof... water- and weatherproof. Available in full width and split types ... sizes to meet all needs.

Exclusive Split Door Seal

Drawing above shows simple Met-L-Wood Split Door Seal which assures weather- and watertightness for years of continual use. Seal also provides effective cushion when closing split doors.

PASSENGER CAR END, VESTIBULE, INTERIOR DOORS

Sound-deadening, insulating, vibration-damping Met-L-Wood doors for passenger cars add to service life, cut deadweight ... Combine modern, clean-line beauty with great strength and durability. Furnished for manual or automatic operation, with or without hardware assembly. Tapping plates for hardware are built into doors ... invisible additions to strength and trouble-free service life. Sizes and types to fit all requirements ... exact dimensions insure quick assembly and perfect fit. Door thicknesses from ½" up, as required.

CABOOSE DOORS

Met-L-Wood caboose doors are built to last the life of the caboose—and to give trouble-free service the whole time. Weather-proof, warp-proof, rot-proof doors can be provided with or without stationary windows in all-rubber sash or with standard drop sash. Available with or without hardware. In all sizes to exactly meet specifications.

DIESEL LOCOMOTIVE DOORS

Widely used by builders on new locomotives, Met-L-Wood doors guarantee trouble-free operation of end and interior doors on diesel road locomotives and cab doors for diesel switchers. Furnished to exact dimensions, with or without windows; either with hardware installed, or with tapping plates placed for hardware assembly on the job.

Write for this Bulletin

Met-L-Wood Bulletin 520 gives the complete, illustrated story on Met-L-Wood doors for railroad uses ... shows construction details, describes standard and special types and sizes. Your copy sent free upon request—write for it today.

MET-L-WOOD
CORPORATION

6755 W. 65th Street
Chicago 38, Illinois

MET-L-WOOD • *STRONG... LIGHT... Smooth Finish... Sound Deadening... Fire-Resisting... Insulating*

Electro-Motive adds a New Factory —in Salt Lake City

EMERYVILLE, CALIF.

SALT LAKE CITY, UTAH

LOS ANGELES, CALIF.

*FORT WORTH,

THE *seventh* in Electro-Motive's nationwide network of Factory Branches is now ready to serve railroads in the Salt Lake City area.

This new facility is completely equipped to remanufacture and modernize Diesel locomotive components with the same techniques and precision standards employed at our main plant.

Machines and tools used by Electro-Motive represent a tremendous investment. They are specially designed to meet high production demand with close dimensional accuracy. Operated by skilled workmen, they assure highest quality rebuilds at lower cost with less out-of-service time.

Each Electro-Motive Branch maintains stocks of rebuilt Diesel locomotive components for *immediate* shipment on "Unit Exchange." Every assembly remanufactured for stock incorporates all the latest engineering improvements. In fact, "Unit Exchange" components often carry *double* the warranty they had when new.

Addition of this new Factory Branch in Salt Lake is another step in Electro-Motive's continuing "Unit Exchange" program to keep pace with the growing needs of America's railroads.

This service not only saves money for our customers —it helps keep General Motors locomotives "on the go" for life!

*MINNEAPOLIS, MINN.

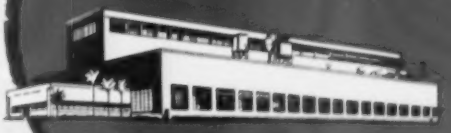
Branch

LA GRANGE, ILL.

ROBERTSON, MO.

HALETHORPE, MD.

TEXAS



JACKSONVILLE, FLA.

Production-Line Rebuilds—Traction motor rewind line at new Salt Lake City Branch demonstrates the advantages of volume rebuilding. Armatures are rewound on a station-by-station basis, using latest factory mass-production jigs, fixtures and tools. Even more important, latest design improvements and new longer-life materials are automatically incorporated in every Electro-Motive rebuild to bring it to the same performance standards as current models. *Illustration shows traction motor armature balancing.*

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

La Grange, Illinois • Home of the Diesel Locomotive

GENERAL MOTORS LOCOMOTIVES

Nine Regional Warehouses and Factory Branches to serve you:
La Grange, Ill. · Emeryville, Calif. · Halethorpe, Md.
Jacksonville, Fla. · Los Angeles, Calif. · Robertson, Mo.
Salt Lake City, Utah · *Fort Worth, Texas · *Minneapolis, Minn.
*Parts Warehouses

Time

. . . rides on your side with

Streamlite HAIRINSUL

LOW CONDUCTIVITY . . . Thoroughly washed and sterilized, all-hair heat barrier. Rated conductivity —.25 btu per square foot, per hour, per degree F., per inch thick.

LIGHT WEIGHT . . . Advanced processing methods reduce weight of STREAMLITE HAIRINSUL by 40%.

PERMANENT . . . Does not disintegrate when wet, resists absorption. Will not shake down, is fire-resistant and odorless.

EASY TO INSTALL . . . Blankets may be applied to car wall in one piece, from sill to plate and from one side door to the other. Self-supporting in wall sections between fasteners.

COMPLETE RANGE . . . STREAMLITE HAIRINSUL is available ⅛" to 4" thick, up to 127" wide. Stitched on 5" or 10" centers between two layers of reinforced asphalt laminated paper. Other weights and facings available.

HIGH SALVAGE VALUE . . . The all-hair content does not deteriorate with age, therefore has high salvage value. No other type of insulation offers a comparable saving.

. . . because time has yet to destroy or impair the high insulating efficiency of *Streamlite* HAIRINSUL

Even after twenty or more years of service, STREAMLITE HAIRINSUL has been removed from refrigerator cars and re-used in new cars without need for further processing or renovating.

STREAMLITE HAIRINSUL, the all-hair insulation that actually weighs 40% less and gives so much more in efficiency and economy is a one-time investment.

At left are still more reasons why leading car builders demand STREAMLITE HAIRINSUL for efficient insulations. Write for complete data.

MERCHANDISE MART, CHICAGO 54

SETS THE STANDARD BY WHICH ALL OTHER REFRIGERATOR CAR INSULATIONS ARE JUDGED

THE ENGINEER'S REPORT

DATA

LUBRICANT RPM Delo Oil R.R.

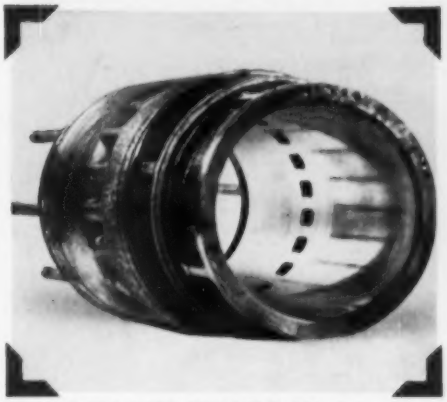
UNIT Diesel locomotive

SERVICE Mountain freight haul

CONDITIONS Long, continuous grades to 1.6%

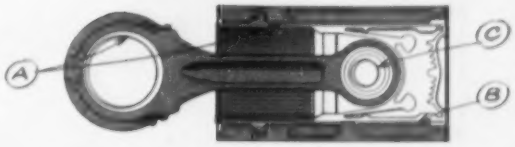
FIRM The Milwaukee Road

333,590 freight miles—only 0.0035 inch liner wear!



LUBRICATED WITH RPM DELO OIL R.R., this representative cylinder assembly was in good condition when pulled for regular inspection after 333,590 actual freight miles. Operation was on The Milwaukee Road's tough run between Othello, Washington, and Avery, Idaho. This liner, shown as it came from the engine, miked only 0.0035 inch wear, 0.001 inch taper, despite hard operating conditions—heavy loads, wide temperature variations, heavy grades, including one stretch of 20 miles of continuous 1.6 percent. Neither wristpin or bushing showed measurable wear.

How RPM DELO Oil R.R. prevents wear, corrosion, oxidation



A. Special additive provides metal-adhesion qualities...keeps oil on parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent scuffing of cylinder walls.

C. Special compounds stop corrosion of any bushing or bearing metals and foaming in crankcase.

FREE CATALOG: "How to Save Money on Equipment Operation," a booklet full of valuable information, will be sent you on request to Standard Oil Company of California, 225 Bush St., San Francisco, Calif.

RPM DELO LUBRICATING OILS

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Barber, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado

The shortest distance between two points is a Safe,

for smooth hauls . . . at high speeds . . .
the TrucTrain rides on A-3 trucks

Designed and developed by _____

Smooth Ride

Keep your eye on a current example of railroad foresight
. . . the Pennsylvania Railroad in cooperation with the Rail-Trailer Company
has inaugurated the new TrucTrain service running daily from New York to Chicago.
It's the first long-distance service of its kind.

Two new, fast trains have just been put into service,
each train with a capacity of 100 loaded trailers. Brand-new, specially built
75-foot flat cars are in the consist, carrying two trailers per day.
Service between points: 29 hours flat!

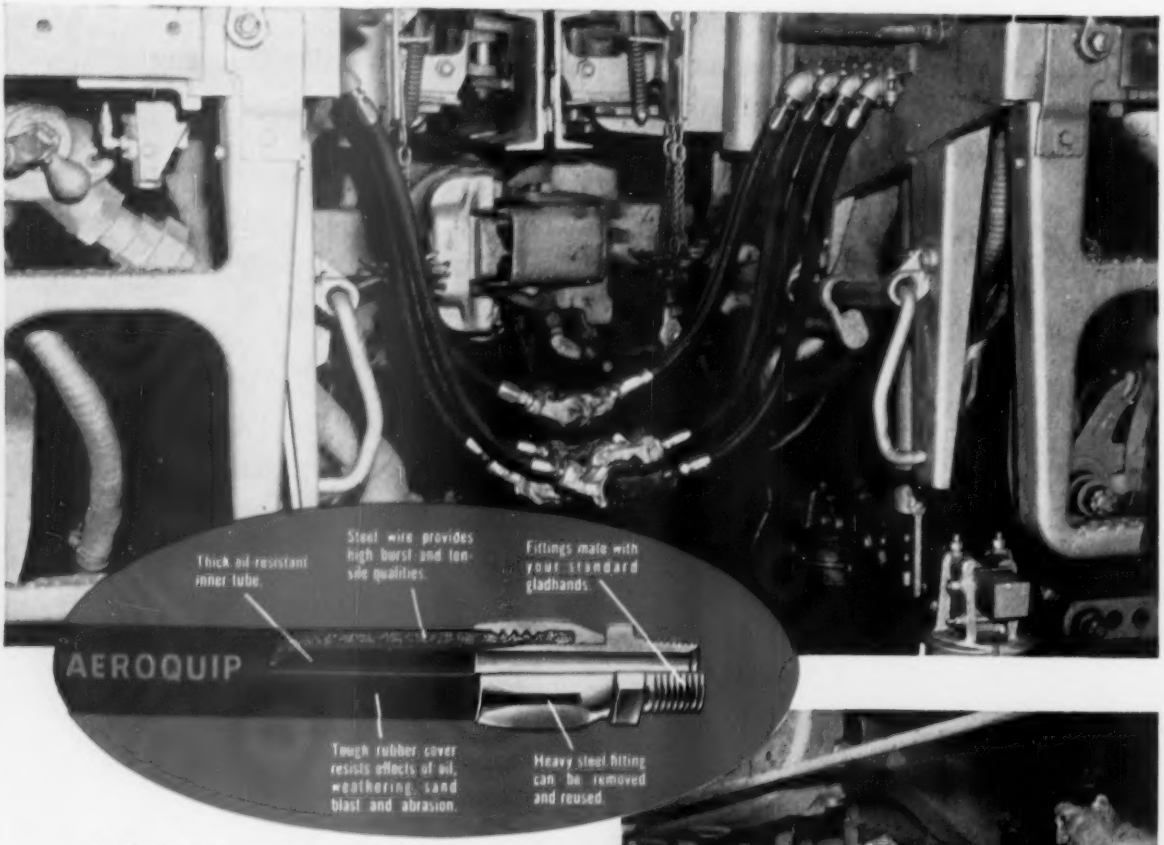
Some will call this an experiment . . . but it's also *progressive railroading.*
Industry benefits from progressive railroading, and industry will patronize it!

ASF

AMERICAN STEEL FOUNDRIES

410 N. Michigan Avenue, Chicago 11, Illinois
Canadian Sales: International Equipment Co., Ltd., Montreal 1, Quebec

New Aeroquip Air Brake Hose Lines Cut Replacement Costs For Santa Fe R.R.


Thick oil-resistant inner tube.
Steel wire provides high burst and tensile qualities.
Fittings mate with your standard gladhands.
AEROQUIP
Tough rubber cover resists effects of oil, weathering, sand blast and abrasion.
Heavy steel fitting can be removed and reused.

The Santa Fe is one of the first major railroads to utilize Aeroquip air brake hose lines for replacements on diesel-electric locomotives and passenger cars. It is estimated that savings will amount to many thousands of dollars a year. Here's why:

(1) Aeroquip fittings are detachable. They may be used again and again for making new hose lines.

(2) With Aeroquip, inventory may be reduced to several coils of bulk hose and a few fittings. Hose lines can be made quickly by cutting the hose to length and attaching the fittings. Only ordinary shop wrenches are needed.

Cut costs! Save time! Start using Aeroquip air brake hose lines as soon as possible. Write for complete information today.

Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

Here's the Gulf program

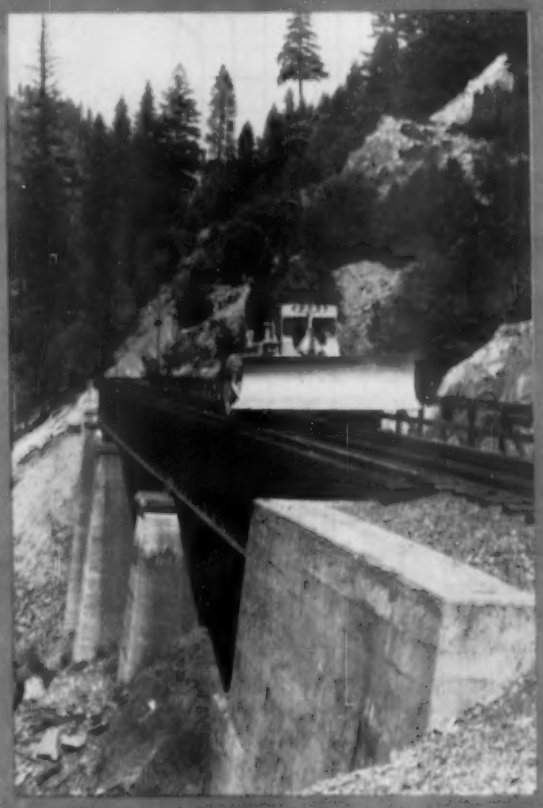
for better maintenance of your *off-track* equipment...

1 the use of uniform high quality lubricants and fuels throughout your system to keep equipment operating smoothly and continuously.

2 expert petroleum engineering counsel that will help reduce your maintenance costs.

3 simplified lubricant storage and handling.

4 prompt lubricant delivery service when and where you need it.



Photograph courtesy of Le Tourneau-Westinghouse Company, a subsidiary of Westinghouse Air Brake Company.

GULF has had wide experience over a period of many years servicing the equipment of leading earth-moving contractors. Now this experience can go to work for you as the basis of a comprehensive program to help insure smooth, dependable operation of your off-track equipment, and lower operating costs.

The Gulf four-point plan incorporates all the essentials of a successful maintenance program. And a Gulf Sales Engineer is always available to help you put it into operation throughout your system.

Contact your nearest Gulf office today and have a Gulf Sales Engineer explain how this program can benefit your operation. For your copy of the informative booklet, "Lubrication and Maintenance Guide for Contractors' and Allied Equipment," send the coupon at the right.

GULF

Gulf Oil Corporation · Gulf Refining Company

1822 Gulf Building, Pittsburgh 30, Pa. RLC

Please send me, without obligation, my free copy of "Lubrication and Maintenance Guide for Contractors' and Allied Equipment."

Name .....

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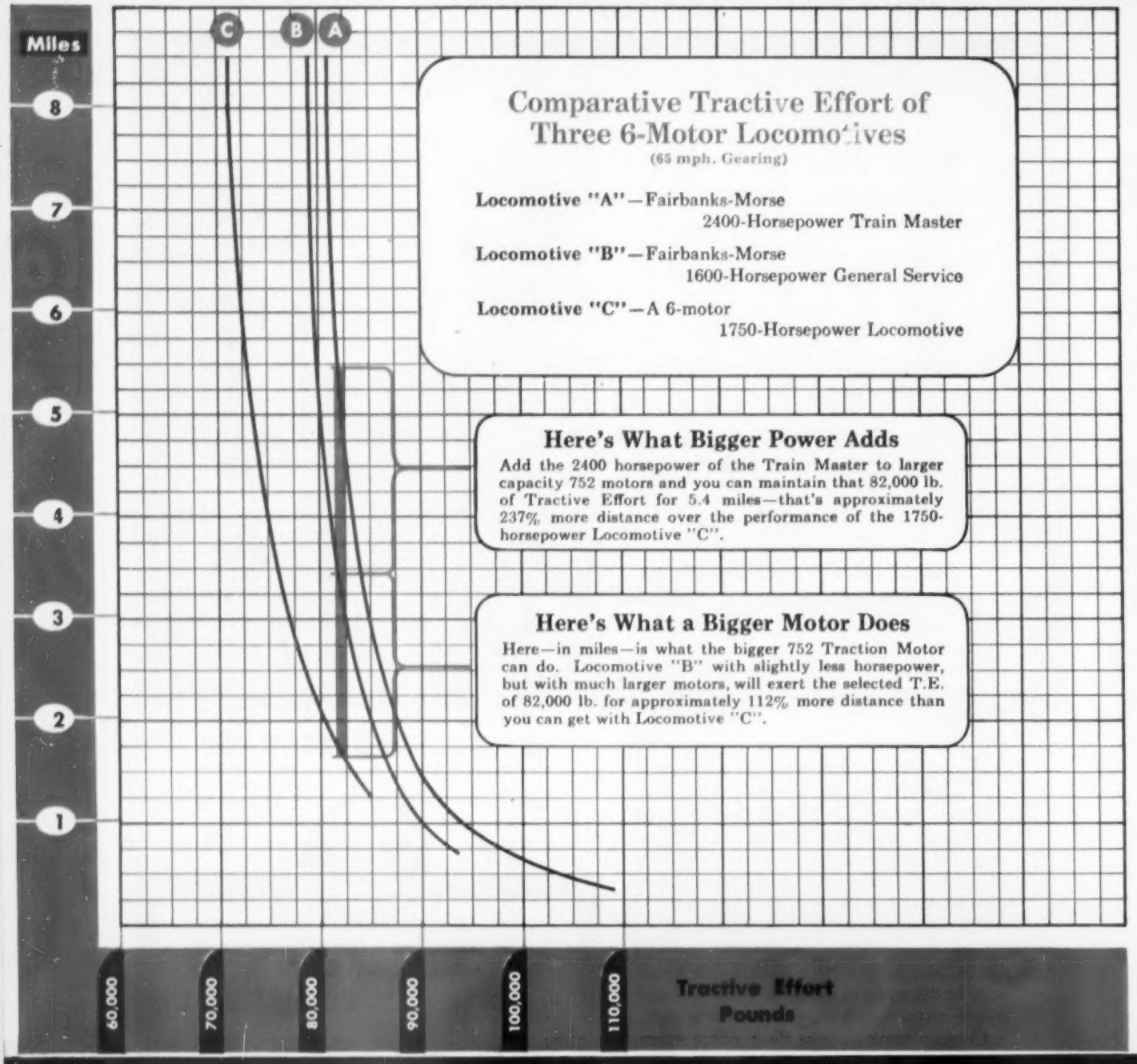
Which would you choose to


Miles
8
7
6
5
4
3
2
1
C
B
A
Comparative Tractive Effort of Three 6-Motor Locomotives
(65 mph. Gearing)
Locomotive "A"—Fairbanks-Morse 2400-Horsepower Train Master
Locomotive "B"—Fairbanks-Morse 1600-Horsepower General Service
Locomotive "C"—A 6-motor 1750-Horsepower Locomotive
Here's What Bigger Power Adds
Add the 2400 horsepower of the Train Master to larger capacity 752 motors and you can maintain that 82,000 lb. of Tractive Effort for 5.4 miles—that's approximately 237% more distance over the performance of the 1750-horsepower Locomotive "C".
Here's What a Bigger Motor Does
Here—in miles—is what the bigger 752 Traction Motor can do. Locomotive "B" with slightly less horsepower, but with much larger motors, will exert the selected T.E. of 82,000 lb. for approximately 112% more distance than you can get with Locomotive "C".
60,000
70,000
80,000
90,000
100,000
110,000
Tractive Effort Pounds

BIGGER TRACTION MOTOR CAPACITY

BIGGER HORSEPOWER

MAKE TRAIN MASTER YOUR SOUNDEST MOTIVE POWER BUY

do with your Train Masters?

1 Haul More Tonnage?

According to the chart, if you were using Locomotive "C" on a 5-mile ruling grade, its 1750-horsepower and smaller traction motor capacity would rate a Tractive Effort of about 73,300 lb.

Put your Train Master on that same hill. Locomotive "C" would need help over the grade to meet tonnage ratings set by the Train Master, for the TM's larger horsepower and greater traction motor capacity would rate a T.E. of 82,600 lb. for the distance.

Use your Train Master power this way and you will haul up to 15% more tonnage than with Locomotive "C", at rated traction motor temperatures.

This superiority of the Train Master is analogous to the superiority of diesel-electrics generally over the steam locomotive.

2 Haul Same Tonnage—Faster?

On that same 5-mile hill, you might elect to keep the tonnage ratings set by Locomotive "C". Your 2400-horsepower Train Master would haul the same tonnage over the grade—faster.

The longer the hill, the greater the performance differential in favor of the Train Master.

If this option of operation were your choice, you would be running the bigger capacity 752 motors of the Train Master at much lower temperatures than on Locomotive "C". These lower operating temperatures will result in longer motor life, typical of habits of electrical insulation.

Either Way

. . . Train Master's greater traction motor capacity and greater horsepower give you greater motive power performance than any other 6-motor locomotive. Fairbanks, Morse & Co., 600 South Michigan Avenue., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL LOCOMOTIVES AND ENGINES • RAIL CARS AND RAILROAD EQUIPMENT •
ELECTRICAL MACHINERY • PUMPS • SCALES • WATER SERVICE EQUIPMENT • MAGNETOS

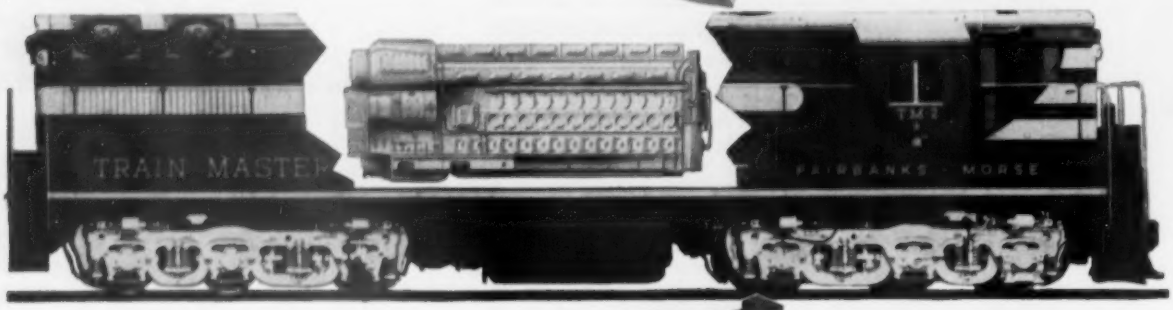
What every railroad's top management should know about aluminum bearings

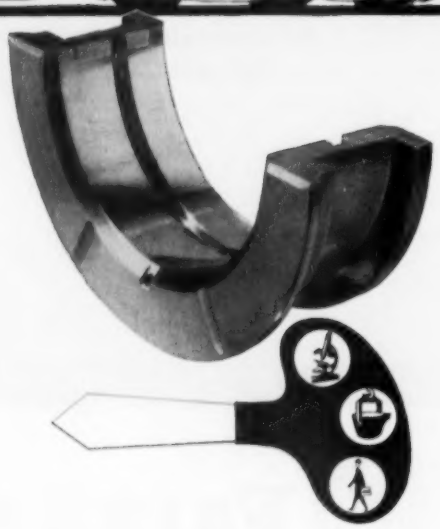
Fairbanks-Morse uses solid Alcoa® Aluminum Bearings for the full engine set in their great new TRAIN MASTER—and here's why:

Alcoa's Development Division, working hand in hand with engineers from Fairbanks-Morse, produced the first all-aluminum bearings for use in diesel locomotives. Fairbanks-Morse began using these bearings in their 8¼" x 10" Opposed Piston Diesel Engine—and the results were so outstanding that they have equipped the revolutionary new *Train Master* Locomotive with a full engine set of long-lasting Alcoa Aluminum Bearings.

If your road has Fairbanks-Morse Locomotives, then a quick check of your service records will show you that they require less maintenance on bearings than any other locomotive in use. Your maintenance foreman can probably tell you without using the record book, because locomotives which are trouble-free are remembered . . . and respected.

Alcoa Aluminum Bearings last longer because they move heat fast and eliminate hot spots. They offer the ultimate in corrosion resistance and have extremely high load-carrying ability. They are solid bearing metal all the way through, with no hard backing to score expensive shafts—cause costly down-time. What's more, these bearings in many cases actually cost less than the bearings you're now using! Our Development Division Engineers can give you the whole story on these bearings—just write: ALUMINUM COMPANY OF AMERICA, 1986-F Alcoa Building, Mellon Square, Pittsburgh 19, Pa.





Your Guide to Aluminum Value

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'PREMIUM' CAR

TO SELL 'PREMIUM FREIGHT SERVICE'

HERE'S a car to carry premium-freight to build traffic that pays a profit. Cushion Underframe equipped [a] it protects lading against excessive impacts. With improved trucks [b] and improved bearings [c] it is a smooth riding car. Extra wide doors [d] facilitate mechanical loading. Load retainers [e] reduce shifting and surfaced floors [f] are smooth and clean.

Every device is proven . . . the protection afforded actual. It is the freight car of tomorrow *ready today*.

A
WAUGH
HIGH CAPACITY
Cushion Underframe
100,000 CARS
Waugh Cushion Underframe Equipped
The only Cushion Underframe that eliminates free-slack, the Waugh High Capacity Cushion Underframe protects cars and lading at impact speeds far above the closing speed of conventional draft gears.
Studies indicate that this cushioning device will cut lading damage cost and car repair costs by half.
Inquiries invited.

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Lubrication... sets the pace!

- **SINCLAIR GASCON® GL-HD LUBRICATING OIL**
  Used on over 100 railroads

- **SINCLAIR RUBILENE® OIL**
  For Diesel Locomotive Air Compressors

- **SINCLAIR ROLLER BEARING OIL 62**
  For car and locomotive roller bearings, and traction motor support bearings

- **SINCLAIR 53 CAR OIL**
  Meets and surpasses all AAR requirements

- **SINCLAIR FILTERTAC AIR FILTER OIL**
  For locomotive and passenger car viscous impingement air filters

- **SINCLAIR JET LUBRICANT TM**
  The sturdy, stable, long-lasting Pennsylvania refined traction motor gear lubricant

- **SINCLAIR LITHIUM ROLLER BEARING GREASE**
  For freight and passenger car roller bearings, AAR-approved

- **SINCLAIR AAR BRAKE CYLINDER LUBRICANT**
  A year-'round lubricant for reliable brake action

SINCLAIR REFINING COMPANY
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Railway Sales • New York, Chicago, Houston

HERE'S A

"Made-to-Order" Job

FOR

UNIONMELT

WELDING

Installing nailable steel flooring in gondolas and other cars can be done at high speed and low cost using the automatic UNIONMELT method. Welding in all of the flooring of 200 gondolas at the rate of *one car an hour* was recently achieved by a Midwestern railroad. They used two UNIONMELT heads, one on each side of the car, to weld the hold down bars to the side sill and with a second pass to weld the bars to the new steel floor members.

This new use for the automatic UNIONMELT welding method is just one more added to the long list of money-saving applications for car repairs and construction.

Why don't you get more information on how UNIONMELT welding can speed operations and cut costs in your shops.

RAILROAD DEPARTMENT

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A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

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Supplying to railroads the complete line of welding and cutting materials and modern methods furnished for over forty years under the familiar symbol - - -

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LOW COST MODERNIZATION
FOR CARS OF ALL CAPACITIES..

NEW

C-R®

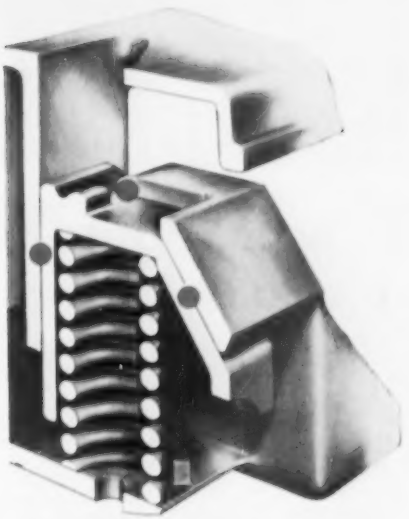
(Cushion-Ride)

PACKAGE UNIT

Applicable to *all* previously built, non-friction control trucks. Available with 2-1/2″ or 3-1/16″ spring travel.

ENGINEERED and BUILT BY

Buckeye



CUTAWAY OF THE BUCKEYE C-R PACKAGE UNIT SHOWING THE FEATURED MAXIMUM FRICTION BEARING SURFACES

FOR COMPLETE INFORMATION . . CALL OR WRITE
Refer Adv. 11882

Ask for Bulletin No 204

The Buckeye Steel Castings Co.
COLUMBUS, O.
NEW YORK, N.Y.
CHICAGO, ILL.
ST. PAUL, MINN.

"THE BIG SQUEEZE"

puts thousands of extra miles into every

WROUGHT STEEL WHEEL

●That block of hot steel is under *14,000,000 pounds pressure!* Yet, only a few effortless seconds are required for the huge press to descend and rise—just a few seconds, and a red-hot wheel blank is hoisted from the die. Thus, the first forging takes place in the life of a USS *Wrought* Steel Wheel.

Basically, steel possesses the inherent properties of *hardness* to resist wear, *strength* to withstand heavy loads, and *ductility* to minimize sudden brittle fractures. This excellent combination of properties is improved by forging, rolling, and controlled-cooling, imparting to the finished *Wrought* Steel Wheel an extremely high degree of soundness and dependability.

But what does the Wrought Steel Wheel do for you?

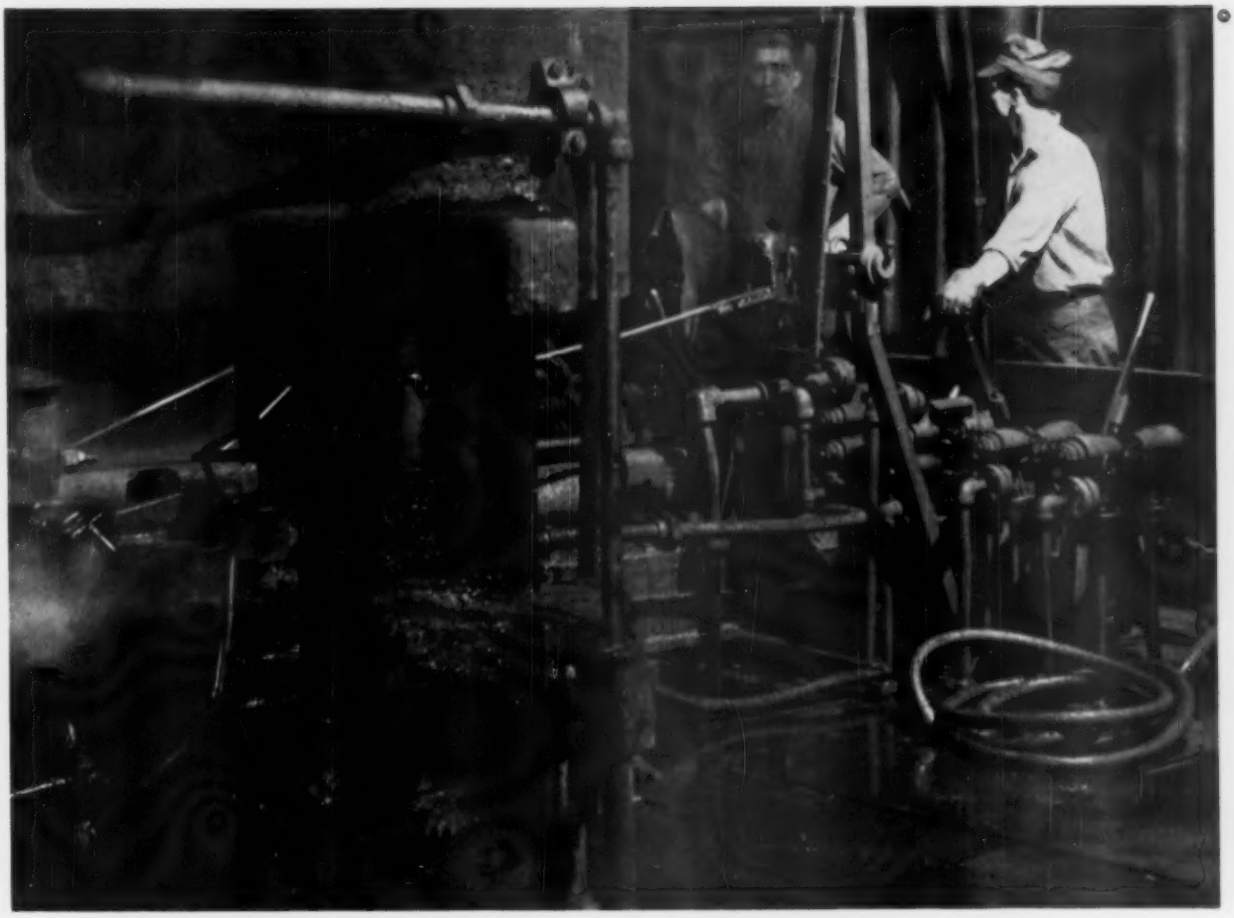
IT LASTS LONGER . . . USS One-Wear *Wrought* Steel Wheels will average 200,000 to 300,000 miles or more in normal freight car service.

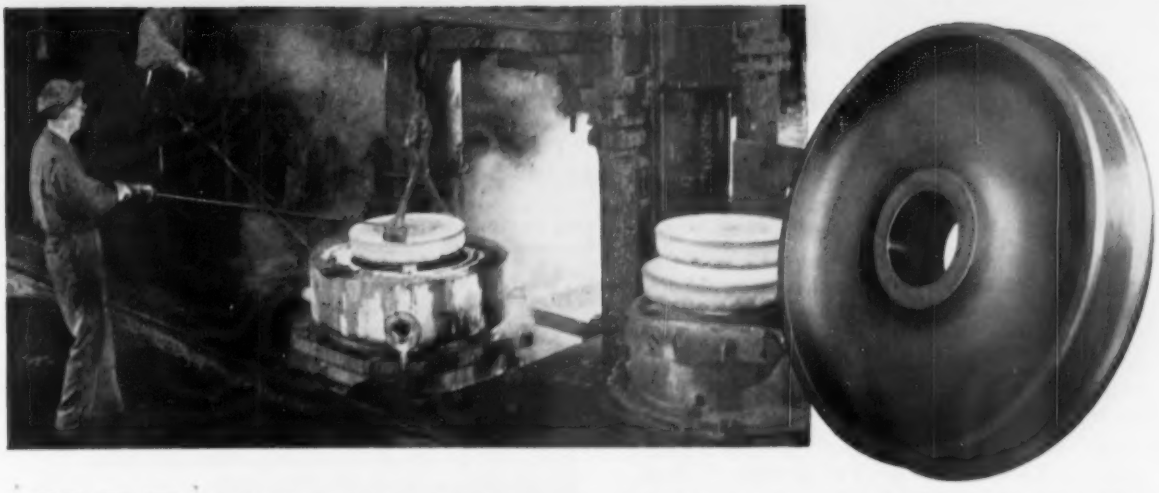
IT COSTS LESS . . . Its far greater life in any given service will reflect a *substantially lower cost* than that of the ordinary wheel, even though, initially, the One-Wear *Wrought* Steel Wheel costs a little more than the ordinary type wheel.

REQUIRES LESS MAINTENANCE . . . Rolling on One-Wear *Wrought* Steel Wheels, a car spends more time *in service,* and less time on repair sidings, resulting in increased revenue to the railroad. Also, less frequent repair means reduced maintenance and lower labor costs.

SAVES UNSPRUNG WEIGHT . . . Because they are lighter than ordinary wheels, eight *Wrought* Steel Wheels under a 50-ton capacity car will save approximately 1,520 lbs. of unsprung weight, which can be directly converted into payload capacity—or result in a fuel savings due to the decreased load. Furthermore, reduced unsprung weight means less pounding on the track system.

Two strategically located complete wheel shops are ready to fill your orders for *Wrought* Steel Wheels: McKees Rocks (Pittsburgh), Pennsylvania, shop, serving the East and Southeast, and the Gary, Indiana, shop supplying the Western and Southern Lines.





USS WROUGHT STEEL WHEELS

UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.

USS

COLUMBIA GENEVA STEEL DIVISION, SAN FRANCISCO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

4-1204

UNITED STATES STEEL

THE NATIONAL BRUSH LINE

TRADE-MARK

FOR TRACTION MOTORS, GENERATORS AND AUXILIARIES

When you specify brushes, do you take into account *all* the cost-factors affected by brush performance?

HERE'S HOW TO FIGURE REAL BRUSH COST:

Service Life: brush replacement cost is far more than the cost of the brushes. The down-time involved in more frequent brush installation quickly eats up any first-cost "economy".

Strength: brush breakage and shunt failure mean costly interruptions of service – wear or damage to major equipment.

Commutating ability: frequency of commutator maintenance and overhaul is a direct measurement of brush economy. Arcing, chatter, bar-burning, copper-dragging and threading are often signs of faulty brush performance.

The cheapest brush is the brush that costs least to use. That's one reason why far more "National" brushes are used in diesel-electric locomotive service than all other makes combined.

FREE! National Carbon's BRUSH DIGEST – two-year course in motor and generator maintenance . . . specially edited for operating personnel. Order in bulk for all your men!

The term "National", the Three Pyramids Device and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY

A Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y.

SALES OFFICES: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco

IN CANADA: Union Carbide Canada Limited, Toronto

EDITORIALS . . . . . .

Are Lighter Faster Trains Feasible?

Not many railroad men realize that a single diesel freight unit can pull a bigger train at 20 mph than four units of the same horsepower can pull at 60 mph or that the one unit can pull at about 30 mph as much as four like it can pull at 60 mph. Nor do many appreciate that this is but one of three disadvantages of running shorter, faster freight trains. The other two disadvantages are that fuel consumption would rise substantially and that a considerably larger fleet of locomotive units would be required to handle a given volume of business.

Now just why are the above statements true and just why should these points be of anything more than merely academic interest to the mechanical maintenance man?

The effect of running shorter but faster freight trains can be approximated by comparing the average fuel cost of freight-train operation with that of passenger-train operation. Such a comparison will show that the fuel cost for passenger operation is approximately twice that of freight operation on a gross-ton-mile basis. Therefore, if the freight train were to dwindle in size and increase in speed, the fuel cost would approach that of the passenger train to the same degree that the size and speed of the freight train approached that of the passenger train.

The second penalty to be paid for running lighter, faster freight trains would be the additional units that would be required to handle a given volume of business. Again the passenger service can be used as a good yardstick to project the effect of shortening and speeding up the freight operation. Statistics show that the gross ton miles per hour produced by the average passenger train is somewhat less than half that produced by the average freight train. It is only logical to expect, therefore, that the gross ton miles per hour produced by freight trains would be reduced in the same proportion that their size and speed approached that of passenger trains. The net result of this would be that more units would be required to handle a given volume of business.

Just what does this mean to the mechanical maintenance man? It is certainly a strong indication that speed alone is not the full answer to the problem of the railroads' declining share of the freight business. There may be other and cheaper ways to accomplish the same results. For example, a reduction of 15 to 20 min in predeparture inspection time can be equal to a higher top speed of nearly 10 mph for the next hundred miles. But where the higher speed will entail higher operating costs and perhaps necessitate an extra diesel unit on the head end, the faster inspection may be attained at no extra cost.

On the other hand, it is conceivable that faster overall movement on the average may be attained by lengthening, rather than shortening, inspection time. How many times could a hot box and its hour or so delay have been prevented by a few more minutes at the terminal? Sticking brakes that could have been remedied by a few more minutes at the terminal but which end up causing a break-in-two—how often do they occasion several hours delay to the train affected and to other trains on the line?

Perhaps the most revealing conclusion that can be drawn is how much it costs to make up the time lost by road failures or to compensate for added inspection time. The increased speed necessary is not cheap. It may be a good deal cheaper to attain the same end by generally higher standards of maintenance or by a number of other things within the realm of the mechanical man's ingenuity, ranging from faster and better inspection procedures on through improved organization and work methods and possibly more efficient facilities.

Life of a Diesel

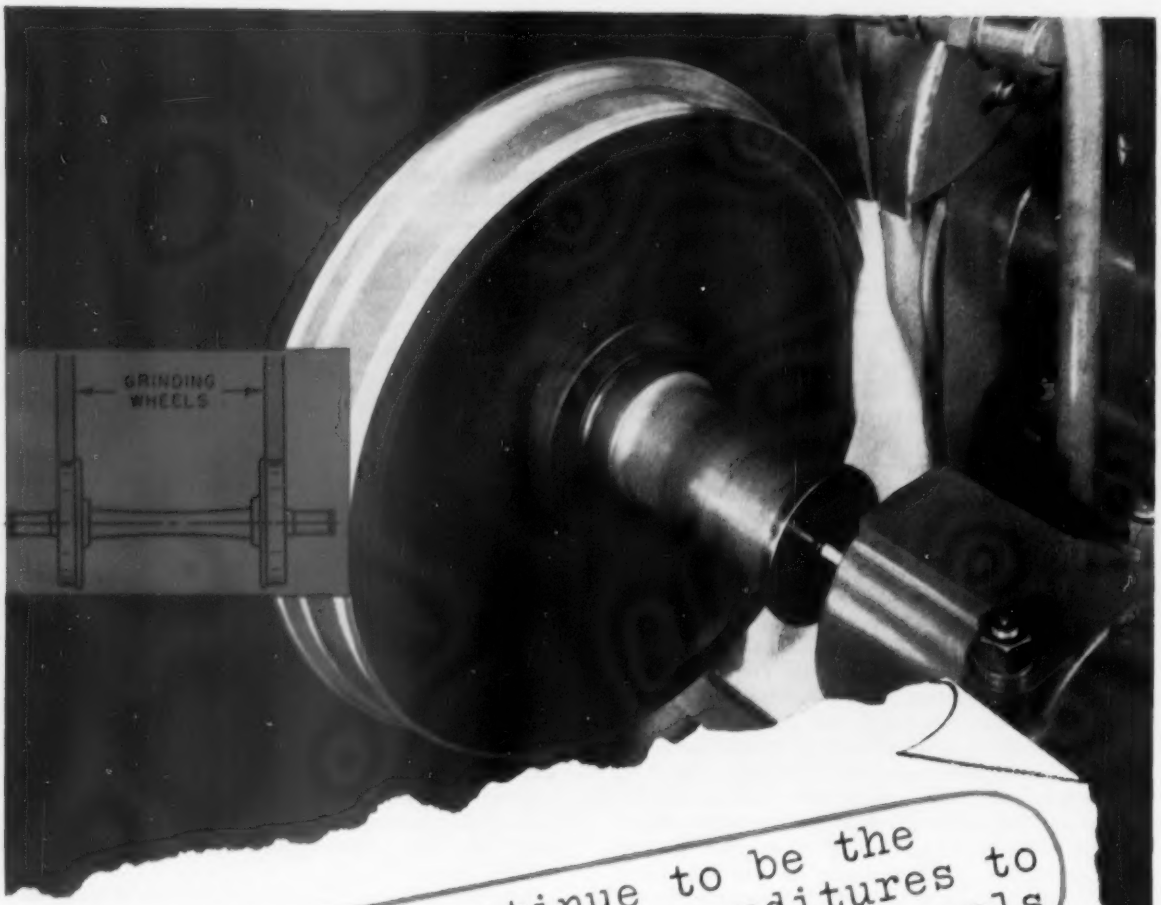
What is the economic life of a diesel-electric locomotive? When the head of the mechanical department of one railroad was asked this question, he said, without equivocation, "Fifteen years." A second, on another railroad, asked the same question, said, with equal assurance, "Thirty years."

Why the difference? The basic thinking of these two men is essentially similar. Both agree that any locomotive can be maintained in nearly its original condition as long as it is practicable to do so. They both also hold to the premise that single maintenance items, or overhaul costs be held to limits which will avoid their being added to capital account. In this they are not in agreement with those who believe in the complete rebuilding of locomotives which may be from 8 to 12 years old. This is based on the assumption that improvements in components will justify this procedure.

Differences in the thinking of the two men were derived from two different concepts. The first believes that parts maintenance should be continued until major overhaul of the locomotive chassis becomes necessary. The second maintains that the body and frame of a locomotive may be continued on a parts replacement basis, as long as economics warrant.

The second difference in the thinking of the two men is brought about by differences of opinion on progress of design. One thinks that locomotives built today will be made obsolete by new designs produced 15 years from now. The other thinks the locomotives purchased now can economically be kept in competition with new designs for a period of 30 years.

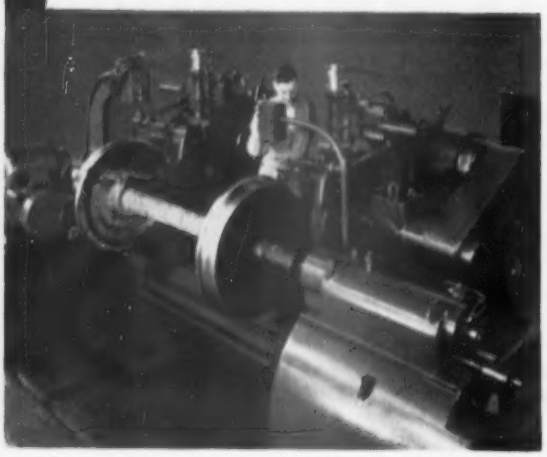
It is possible that within the limits of their type of operation and maintenance procedure, both men may be right. But a two-to-one ratio is a wide one. If opinions did not vary over so wide a range, purchasers of new locomotives as additions or replacements could look to the future with increased confidence.



"Wheel shops continue to be the object of extensive expenditures to obtain more accurate work on wheels and axles."

Quotation from Railway Age Outlook Letter

FILMATIC



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To meet output requirements and improve quality, Cincinnati Grinders Incorporated developed this car wheel grinder. It simultaneously grinds two wheels to the close accuracy demanded by today's improved service . . . roundness within .001" and concentricity with journal diameters within .003". Diameters ranging from 20" to 45" can be ground on these machines. ¶ You can expect long productive life and negligible maintenance when you install CINCINNATI FILMATIC Car Wheel Grinders because the grinding wheel spindles are mounted on FILMATIC bearings. This construction requires no adjustment, no attention whatever except lubrication. You may obtain complete details by writing for Cincinnati's "Report" magazine, Vol. 9, No. 4.

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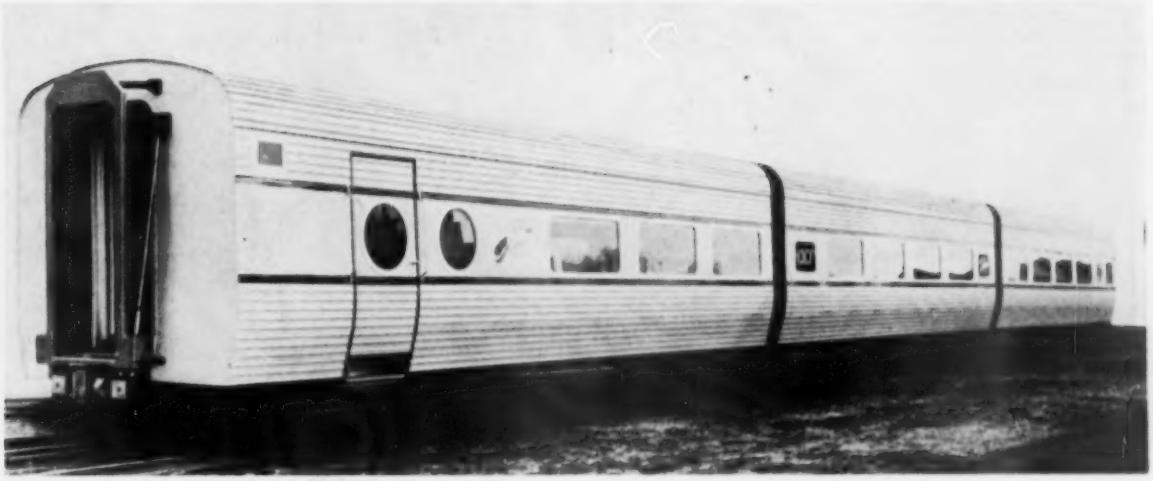


With the exception of head-end power, the three-unit 1955 Talgo coach is an independent unit. It can be handled and switched like conventional passenger equipment.

US Talgos Will Have Three-Unit Cars

American requirements and Spanish experience result in new Talgo design; ACF produces first coach.

American railroad requirements have led to the production of the first three-unit articulated Talgo-type coach by ACF Industries, Inc. Late this year four of these cars will be delivered to the Rock Island for the Chicago-Peoria "Jet Rocket." Next year the New Haven will receive others of the same type for their New York-Boston Talgo train. The ACF coach has undergone running tests near the builder's plant at Berwick, Pa. While the two trains are being built, this car will be making demonstration runs with the locomotive from the original Talgo demonstrator train.

Two Talgos went into regular service in Spain over five years ago. Studies by RENFE, the Spanish national railways, have revealed that a saving of over 60 per cent would be brought about by using Talgo equipment for all their train services. The two Talgos have been in daily operation between Madrid and the French border over mountainous country with grades in excess of two per cent and altitudes from sea level to 4,500 ft. The previous 12-hr trip is made by the Talgos in 8 hr. Service has never been interrupted by mechanical failure.

The two trains delivered to Spain are composed of multiples of five units and are completely articulated. Two coach units are placed at each end of an equipment unit. The equipment unit contains toilets, storage space, and the airconditioning equipment. Power and water come from the locomotive. This five-unit assembly is called a coach, but is not a separate vehicle which can be readily cut out of the train.

Broad as it is high, the 1955 Talgo is shown during tests near Berwick. The three-unit coach is separated from the original Talgo locomotive by one coach unit ACF is using for test purposes.

Three units make up the 109-ft length of this coach. The intermediate partitions are over the connections that retain the full articulated principle used on the original Talgo trains.

In the new train, articulation is used only between the three units of each car but not at its ends. The front of the lead unit of each coach has its own wheels rather than resting on the rear of the unit ahead. At both ends of the three-unit car are tightlock couplers, curtain diaphragms, and air-brake and electrical connections. Coupling such cars into a Talgo train will be much the same as coupling conventional equipment. Not only is switching made easier, but cars of the new design will operate in either direction. This will make Talgo adaptable to many applications where turning the train is difficult.

The three-unit Talgo car has been designed to accommodate all interior arrangements. While the present car is a coach, the space can be used for parlor, dining or sleeping accommodations. Standardizing the basic structure is expected to achieve some mass-production economies. The car has been designed to fit all American clearance requirements. Its extra width is possible because the short unit length causes less overhang on curves.

The 800,000-lb buffing load and other RMS and AAR standards are met by the units. The underframe, side and roof are prefabricated and assembled into an integrated, tube-like, stressed-skin structure. Low-alloy high-tensile steel can be used throughout. A low-alloy frame with aluminum-alloy superstructure or stainless-steel sheathing are other possibilities.

The tightlock couplers have a center height of only 19 in. The builder has suggested equipping conventional switching locomotives with an additional coupler below the present one, or using an auxiliary coupler slipped over the Talgo coupler. Brakes on the new coach are completely pneumatic. The hydraulic circuits used in the brakes of the original Talgo have been eliminated. However, the automotive type of internal expanding brake is retained. The Spanish service has shown that these brakes have a shoe life in excess of 500,000 miles. The three-unit car has its own water supply.

The new Talgo coach depends on a trainlined head-end source for 440-volt, 3-phase, a-c power. Maximum electrical requirements for each car will be about 40 kw. This load is high because, in addition to lighting and air conditioning, the car has complete electric heating. The car is equipped with batteries and a trickle charger to allow greater flexibility and for emergencies.

An electro-mechanical freon air conditioning package is installed at each end of the three-unit car. Each package is rated at five tons. Installation at the car ends permits easy access and replacement for maintenance and overhauling. Heating is accomplished with electric-strip heaters in the air duct system and in the floor.

The basic car seats 84 passengers with seats spaced on 42-in. centers. With seat center distance reduced to 36-in., the capacity becomes 96. ACF has developed a Hi-Lo door which permits passengers to enter the car from high-level platforms or from track level. This feature is optional and would only be supplied for lines requiring it. Because of the flexible and reversible car now developed, ACF believes that the cars can be used in train service with a locomotive at the front end only, or in motor-train service with locomotives at both ends. The motor train would require locomotive control circuits to be trainlined through the cars.

Trains of three-unit Talgo cars can be powered with existing locomotives if the railroad does not have excessive curvature or too fast a schedule. Special low lightweight locomotives are necessary to take full advantage of the Talgo design. Plans for special locomotives will include generators for the a-c train line. If conventional locomotives are used, a power car would supply the a-c power and provide the transition between coupler heights.

COMPARISON OF CARS

	Articulated 1955 Talgo	*Articulated 1949 Talgo*	*Conventional 1954 Coach*
Unit Length, ft-in	34-6½	20-2	85-4½
Total Height, ft-in	10-10	9-7	13-6
Total Width, ft-in	10-2	10-7½	9-11
Rail to Floor, ft-in	2-4	1-6	4-3
Coach:			
Number of Units	3	5	1
Seating Capacity	84	64	80
Total Weight, lb	65-80,000	37,400	131,000
Total Length, ft-in	109-3	101-0	85-4½
Coupler Height, ft-in	1-7	None	2-10½

Magnetic particle inspection of wheels with rectangular-shaped formed coil, 110-volt a.c. design

Magnetic particle inspection of axle gear with magnetic yoke, 110-volt a.c. design

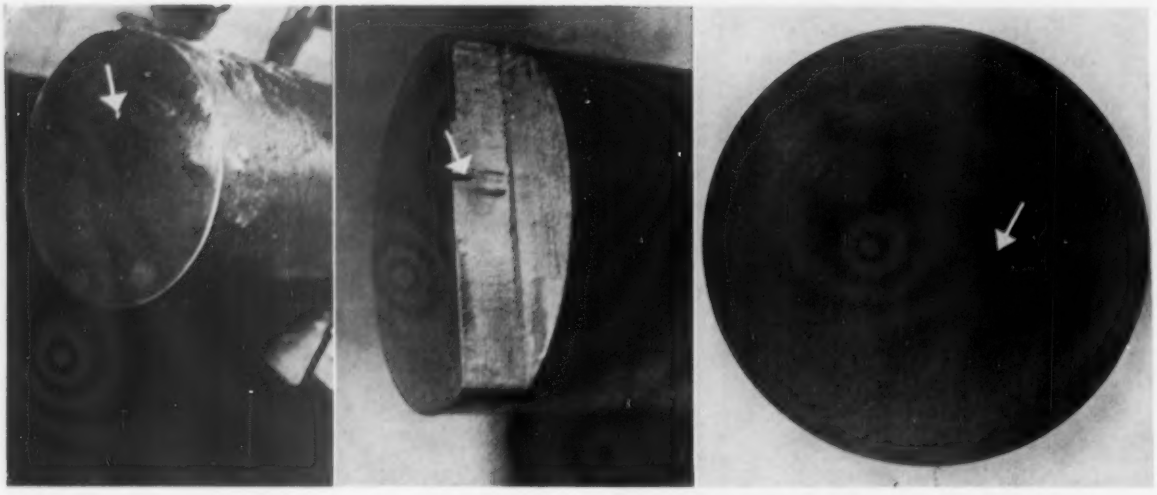
How the Southern Pacific Uses

Non-Destructive Testing . . .

To promote safety, improve inspection, give quality control of materials and reduce overall costs

What is a "pip?" And what bearing, if any, does it have on railroad operation? In railroad parlance, a pip is *not* a chicken's disease, a small seed, or even an expression of admiration. It is an ultrasonic indication in reflected wave form of a defect, such as a non-metallic inclusion in steel, and test engineers and other researchers are now trying to relate the height of the pip to the size of the defect. This and numerous other important matters relating to non-destructive testing were covered in a paper by Arthur S. Pedrick, assistant engineer of research and mechanical standards, Southern Pacific, at the recent Los Angeles meeting of the Society for Non-Destructive Testing, Inc.

Periodic inspection, maintenance and tests are of paramount importance in railroading since safety of operation must be assured at all times. Safety First is usually associated directly with train operation, but successful train operation also depends on quality control of materials and parts used on rolling stock as well as proper



Reflectoscope picks up large flaw (left arrow) which is silicate inclusion about 9 in. from axle end—(Center) Notched axle shows flaw (arrow) extending parallel to the longitudinal axis—(Right) Acid-etched section of axle about 6 in. from one end showing same inclusion reduced in size and other flaws due to poor steel structure

maintenance of this equipment and track, roadbed and related facilities so that all will serve their intended function with the desired reliability and safety in service.

Quality control of materials and inspection of parts in connection with maintenance and shopping of railroad equipment entails a large number of test methods, many of which are highly specialized non-destructive type, and this work on the Southern Pacific is directed by the Research and Mechanical Standards Department.

Some of these test methods are more applicable to railroad work than others. For many years it was common practice to use oil and whiting methods for detecting flaws. In 1939 magnetic particle inspection was brought to the attention of the railroads by the Magnaflux Corporation. This test proved effective in locating fatigue cracks in locomotive side rods, valve motion work, crankpins, axles, piston rods and other important parts of railroad equipment. Fatigue cracks develop at right angles to longitudinal axis of such parts so a longitudinal magnetic field is required. The usual test consists of wrapping three turns of flexible cable around the part and energizing with 500 amp. at about 6 volts. Magnaflux powder is sprinkled on as the coil is moved along the part.

The importance of magnetic particle inspection was soon recognized by the Association of American Railroads and made a mandatory requirement for testing all dismounted car axles used in interchange. This was extended to include the journal portion of mounted axles whenever they are machined. The most recent mandatory requirement in the AAR Wheel & Axle Manual calls for removal of drive pulleys each time mounted wheel assemblies go through the shop for conditioning of wheel treads, so the body of the axle under the pulley mounting can be tested for corrosion fatigue-type defects.

As the use of diesel locomotives increased, there was need for other special kinds of inspection. For example, valves from diesel engines are made of an alloy steel which is relatively non-magnetic due to high percentage of chromium and nickel. Values will not take a satisfactory magnetic test, so other methods such as the Zyglo fluorescent-penetrant-type of non-destructive test has been applied to this problem. Zyglo inspection is set up for inspection of valves at all major points on the SP where diesel maintenance is performed. Its prime purpose is to check used valves at the time of engine overhaul to be sure that these important parts are free from heat checks or any defects which would impair their normal service life. Recently it was found necessary to extend this to 100% inspection of new valves. In December 1954, 1,500 new valves were inspected at the Sacramento Shops and a total of 97, or 6½ per cent rejected. All defect indications in the head portion of valves are cause for rejection except the circular mark which appears near the center of head on some valves and is caused by the forging-hammer operation. The lower end of the valve stem is also checked closely and valves which show defect indications, either longitudinal or transverse, below ½ in. from the upper keeper groove are not used. Longitudinal seams up to one inch in length and located more than ½ in. above the upper keeper groove are not considered injurious to the service life of valves. This inspection will be continued until such time as the desired quality of product is supplied by manufacturers.

Many diesel engine parts are made of ferrous materials and can be tested to best advantage with Magnaglo magnetic-particle inspection. Connecting rods, fork-rod baskets, drawbar pins and similar parts require a longitudinal magnetic field applied continuously with strength about 2,000 to 2,400 ampere-turns. Piston carriers, wrist pins and bearing rollers require a circular field as produced by passing current through the part, or through a heavy bar of copper or brass when the bar can be placed through a hole or opening in the part. Diesel pistons are subject to fatigue flaws at several locations and directions so that both longitudinal and circular magnetic fields must be used to assure complete inspection for all possible defects.

Detecting Internal Flaws

The tests mentioned thus far are essentially for surface crack detection and examination. For detecting internal flaws, radiography with X-rays and with gamma-

Flaw in diesel engine piston carrier discovered by Magnaglo inspection

rays is used, also sonic methods and ultrasonic methods as well as electrical and magnetic field tests which have been applied by means of inspection cars for checking railroad rails.

The SP purchased one of the Sperry Model SR05 ultrasonic reflectoscopes in 1949. This was one of the first ultrasonic reflectoscopes on the Pacific Coast. It has served well for testing the driving axles of steam locomotives and to a more limited extent, crankpins. A frequency of 2¼ megacycles has been found satisfactory for this work.

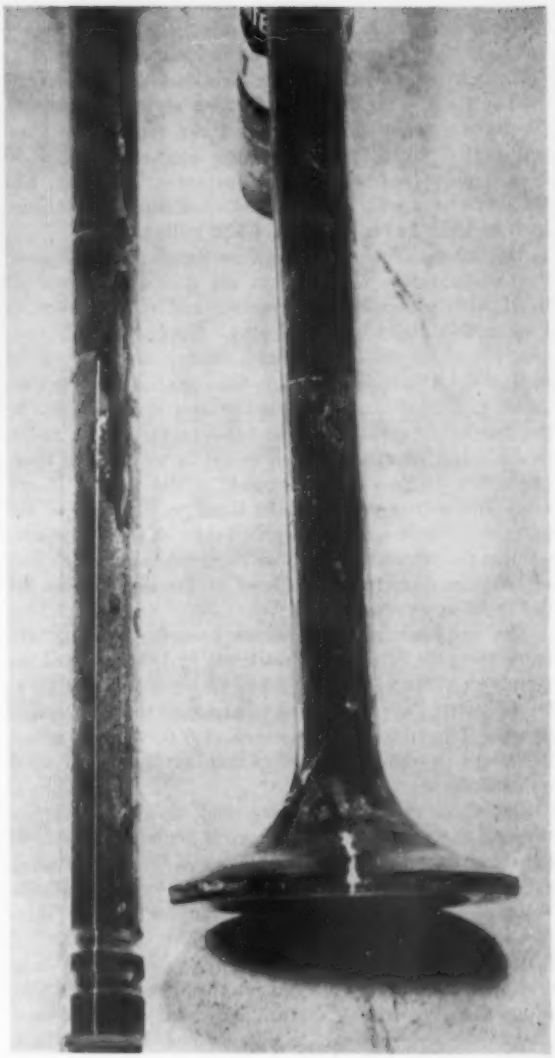
Driving axles are subject to fatigue cracks at the journal fillet near the wheel fit and also just inside the wheel fit where the flaws will not be visible by other tests except by dismounting the wheels from the axles. Crankpins develop fatigue cracks at the point of highest stress which is the fillet area at the edge of the press fit in the wheel hub.

The SP has also applied the reflectoscope to the inspection of diesel locomotive axles. By testing diametrically through the axle, using contact methods and heavy oil as the coupling medium, ultrasonic indications have been found in a high percentage of the axles tested. Many of these indications are near the center of the axle so they are located at or near the neutral axis with respect to stress, in which case they may not be injurious to normal service life of the axles. These indications are usually due to non-metallic inclusions in the steel at the time of manufacture.

There is a problem of interpreting the indications, giving due consideration to their size, direction and location with respect to the highly stressed portions of the axle.

A diesel locomotive driving axle was sectioned through locations where several flaws were indicated by the reflectoscope in order that ultrasonic indications could be correlated with actual physical findings.

By physical examination, as has been shown, the inclusion was found to be at least twelve inches long. However, inclusions of this type are inherent in this grade of steel. Known as secondary piping, they can only be eliminated by using a much better grade of steel for axle fabrication. Although such conditions are not desirable, it is interesting to note that this particular axle



Flaws in diesel valves shown up by Zyglo inspection

had been in service for a period of 13 years. It was still in serviceable condition with no evidence of fatigue so it appears that the strength of the axle was adequate to meet service requirements. It will be necessary to correlate actual service performance with axle steel quality. Further study of these conditions will be required and ultrasonic inspection can be used to good advantage on this problem.

Ultrasonic inspection is also being applied to some extent to the problem of shattered rims which sometimes occur in diesel locomotive wheels. This condition is usually caused by laminations or inclusions during the manufacturing process. The wheel manufacturers are trying ultrasonic inspection methods to detect any internal conditions which might cause wheel failure.

Other Non-Destructive Tests

Other kinds of non-destructive tests have been developed to meet specific problems on the railroads. The Sperry Rail Detector service is a typical example. The

Sperry reflectoscope also works well as additional means for inspecting rail. On the SP, the Branson Audiogage has been applied successfully to rail inspection.

X-ray type inspection has a definite usefulness. Tests similar to this are being performed at the Sacramento laboratory, using gamma rays from radium or from radio-active Cobalt-60. A 5-curie source of Cobalt-60 is available for radiographic inspection purposes and there is also a smaller source which at time of purchase in July 1951 had a strength of 620 millicuries.

The SP 5-curie source must be handled with a good deal of caution. When not in use it is stored in a pit lined with six inches of concrete and eight inches of lead, and is sealed by a lead plug. A spherical lead container with a six-step conical door gives a beam of radiation in limited area when the capsule is in the container and no exposure to the operator if he remains to the rear of the container. The usual procedure for radiographic test of couplers and yokes is to arrange these parts in a circle with the capsule in the center. X-ray films in cassette envelopes are taped to the back of the parts under test. Lead foil on both sides of film in cassette reduces the amount of exposure required, due to the effect of secondary electrons produced in the lead screens by the incident gamma rays.

The exposure required varies according to the distance from the capsule and thickness and character of the metal. A greater distance gives sharper outline of blowholes, cavities, etc., but increases exposure time. A section of steel, 1 in. thick, at a distance of 6 ft. requires about 2.5 hours exposure, using a gamma ray source of 6000 milliroentgens.

Sometimes two exposures are made at different angles through the part in order to give a better indication of the shape and character of inclusions of foreign material, porosity, blowholes or shrinkage cavities in steel castings. Tests of representative samples from the various shipments are usually sufficient for checking the quality of castings and similar materials. Experience at the SP iron and brass foundries at Sacramento has demonstrated that where foundry techniques are improved to establish a normally good product, inspection can be minimized. Experience with the product of suppliers has likewise indicated that rigorous rejection of faulty material has forced modification of manufacturing techniques and assure a much more satisfactory product.

Black Light Checks Fuel Leaks

A new test, helpful to the railroads, is the application of high intensity black light to the problem of finding fuel leaks in diesel engines. Most of the railroad diesel engines have a crankcase capacity of approximately 200 gal. of lubricating oil. Fuel oil leakage into the lubricating oil is one of the most common causes for crankcase oil changes. The SP allows from 3 to 5 per cent fuel oil dilution depending on the equipment and type of service. The amount of dilution is indicated by viscosity tests at central control laboratories, but the finding of small leaks or mere seepage of fuel from joints and pipe connections in the engine becomes a difficult problem.

This form of non-destructive test takes advantage of the fluorescent characteristics of fuel oils and lubricating oils. When exposed to black light, lubricating oil appears as an opaque "milky-white" color, while fuel oil has a "milky-purple" color. Fuel leaks can then be located by shining high intensity black light on the fuel injectors and fuel oil lines, at the same time having fuel pump in operation so that normal pressure will be present and looking for areas showing purple color.

A useful non-destructive test will provide reliable measurements or indications that can be correlated with properties of materials or discontinuities which would affect the serviceability of materials, parts, structures or assemblies. Assuming the most effective form of test has been selected for requirements at hand, there is still a problem of training operators so that best results will be obtained with these special tests. Any testing device or procedure is only as good as the understanding of the people who use it.

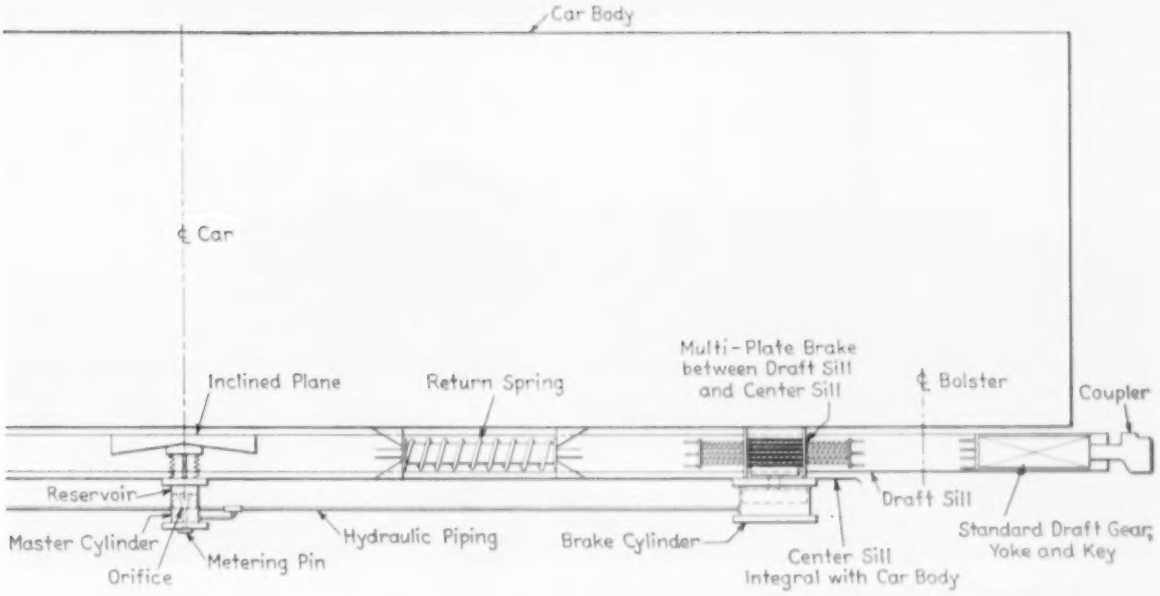
There are many types of flaws, and interpretation must be made to distinguish those which are harmful and will likely cause failure in service. Concentration of stress due to notches, change in section, fatigue cracks, etc., must be avoided. On the other hand, it should be remembered that parts are manufactured to a functional quality. The improved inspection methods now available are capable of showing indications of discontinuities in practically all parts. The cost of parts would be prohibitive if they were manufactured solely to standards of appearance rather than to serve the purpose intended.

The operator, therefore, must have a thorough understanding of the potentials of cracks in parts and whether their direction is relevant to lines of major stress or whether the checks are merely small seams from machining, which are not so oriented as to cause nuclei for eventual failure. Thus, not only an understanding of the practical use of the test is required, but an understanding of the nature of stresses and stress concentrations if inspection is to be of maximum value to the railroad.

Many new, modern test instruments are finding applications in railroad test work. The electron microscope is proving useful in checking stability characteristics of diesel fuel oil and effectiveness of additives in fuel oil and in lubricating oil. Spectrographs and quantometers have also become quite common in railroad laboratories. The SP has two ARL spectrographs. One is in general use at the Sacramento laboratory for foundry controls and miscellaneous testing of unknowns. The other instrument at the SP Los Angeles branch laboratory is used for checking trace elements in diesel crankcase oil.

The SP has been working on a number of research projects; some of them in cooperation with the Stanford Research Institute. These projects include improved sanding of diesel locomotives, hydro-friction draft gear for freight cars and use of cheaper types of fuel in diesel locomotives. These test projects are in addition to the usual work at SP laboratories in connection with problems of maintenance and control of purchased materials.

With further reference to applying non-destructive tests to railroad maintenance, it should be realized that each type of test will reveal only the specific kinds of defects or discontinuities for which it is designed or best adapted to reveal. It will not be a cure-all to overcome lack of knowledge as to reason for service failures and specific nature of materials or prevent early fatigue on account of poor design or improper manufacturing practice. The proper use of non-destructive tests can, however, give additional factual data which are helpful from the standpoint of engineering and design.



How Hydrafriction Cushioning Device Works

The new hydrafriction freight-car cushioning device, now being developed by the Southern Pacific in conjunction with the Stanford Research Institute, utilizes hydraulic control of a friction mechanism which absorbs energy in proportion to the load and speed of impact. Patent applications are pending on the new construction which requires an underframe of special design and hence is limited to use in new cars.

The SP 50-ft. box car, built at Sacramento shops and equipped with the pilot model of this device, including a conventional draft gear in each end of the floating center sill, has been tested in road service and safely cushioned shocks at impact speeds up to 10 mph. This test car has been released to service on SP lines and its performance is being closely watched. The current problem is how to simplify the system and make it economically feasible for wider application.

Since the practicability of the device must be demonstrated by further experimental use and development under widely-different operating conditions, no statement can yet be made about plans for the manufacture, sale or licensing of this device for general use.

Referring to the schematic drawing, the car sill, which carries the pull of the train from one coupler to the other, is separated from the car body by sets of plates that slide over one another. Half of these interlocked plates slide with the car sill and the other half are restricted against the car body. The harder these plates are squeezed together the greater the sliding friction between them and consequently the more energy they will absorb.

The amount of this pressure must be varied according to the speed of impact and weights of the cars and their loads. The hydraulic system does this. A cylinder containing oil is connected bettween the car body and sliding sill by means of an inclined plane and crosshead assembly. It generates an oil pressure proportionate to the movement of the sliding sill by use of a so-called metering pin. This oil pressure is transferred to an hydraulic ram acting on the stack of friction plates so that the greater the impact the greater the hydraulic pressure and the tighter the plates are squeezed together.

In operation, upon coupler impact, the conventional draft gear and draft sill are displaced simultaneously with respect to the car body. As the draft sill is moved by impact, the inclined plane, which is attached to the draft sill, is moved, pushing the piston in the master cylinder down.

The displaced hydraulic fluid at the bottom of the master cylinder escapes up to the reservoir through an orifice in the bottom of the piston. The metering pin projects through the orifice and governs the pressure transmitted by the hydraulic piping to the brake cylinders. By varying the diameter of the metering pin throughout its length, braking pressures are varied depending upon the stroke of the master cylinder piston.

The two multi-plate brakes consist of long plates attached to the draft sill which slide at impact between short plates attached to the car body. When hydraulic pressure is transmitted to the brake cylinder the piston is pushed upward compressing the stack of brake plates, as stated, and causing friction which resists movement of the draft sill.

After the draft sill movement has been stopped by the multi-plate brakes, the return springs, which were compressed by the draft sill movement return the draft sill to its neutral position. This sequence of events is instantaneous and occurs when the car is impacted at either end.

Rebuilt cars move from the erecting shop through this four-track paint shop. Car repair material is stocked close to shop buildings, can be quickly reached.

Cars Repaired in Ex-Steam Shop

Baltimore & Ohio tools heavy car repair production line using abandoned locomotive shop

Weather no longer affects the car repair programs at the DuBois shops of the Baltimore & Ohio. Since July, 1954, all car repairs made there have been done under roof. Much of this protection is provided by buildings of the former locomotive shop. These buildings have been converted so that a production line can be established for heavy freight car repairs. Lighter car repairs are now made through the same shop.

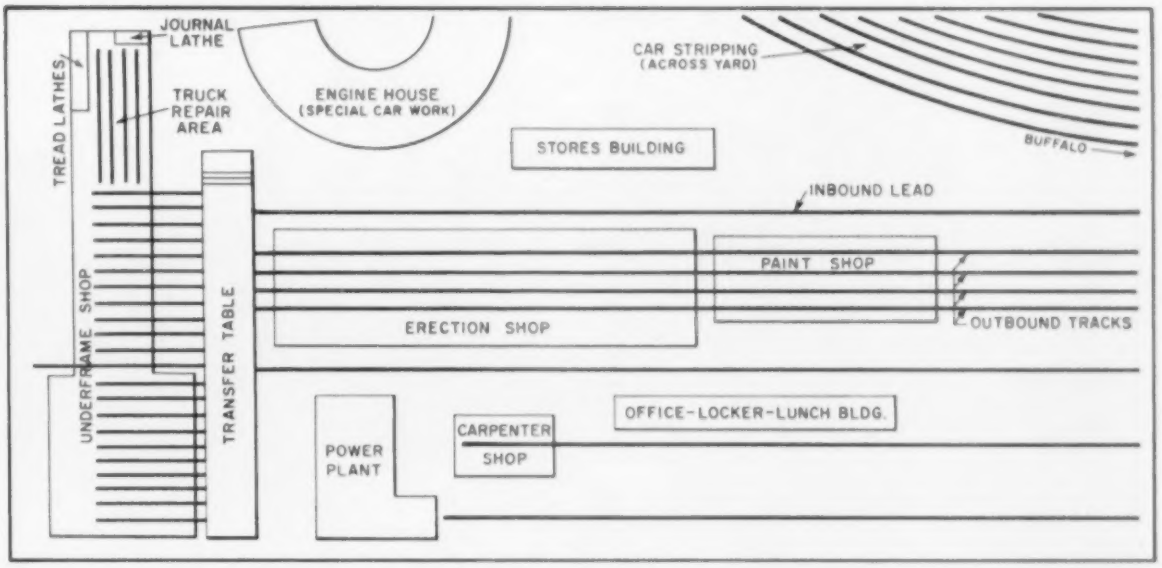
Dieselization on the Buffalo division and other parts of the B & O brought an end to steam locomotive repairs at DuBois, Pa. This installation was formerly the locomotive shop of the Buffalo, Rochester & Pittsburgh. After the B R & P was absorbed in 1932, the B & O continued to do locomotive work there. With the completion of repairs on an eight-wheel switcher in May, 1953, the shop was closed.

Car repair work of the B R & P was also done at DuBois in a shop located at Brady street on the other side of town. The B & O has continued to operate this shop and gradually employment went from 200 to 500. Box cars, cabooses and work cars have always been repaired inside the shop building. Hoppers, flats and gondolas formerly were worked on adjacent outside tracks and frequently these repairs were curtailed by bad weather. Today Brady street shop works only on box cars and non-revenue equipment. The repair of gondolas, hopper and flat cars was moved to the rebuilt locomotive shop July 1, 1954. Work at both shops now proceeds under less crowded conditions.

The locomotive shop included a 30-track transverse type boiler and tank shop serviced by a transfer table. At right angles to the tank shop, and on the opposite side of the transfer table was a three-track longitudinal style erecting shop. This building is 524 ft long, and formerly had machine bays down both sides. This building and the tank shop were equipped with a number of overhead cranes. A carpenter shop, power plant, locker building enginehouse and stores facilities are close by. All these facilities have a role in the new scheme which now turns out rebuilt cars rather than locomotives.

In production-line car repair, the cars delivered to the inbound lead will be stripped ready for rebuilding. This work is done on the far side of the main tracks and the yard in a car department operation otherwise devoted to scrapping cars and locomotives. The original transfer table was too short to handle mill gondolas and during reconstruction the table and pit were extended so that 65-ft cars can be accommodated. Shop cars switched to the inbound lead are moved over the transfer table, and into the shops with two tractors operated by car shop men.

The former boiler and tank building is now known as the underframe shop. Shopped cars are first brought into this building. As overhead cranes lift them from the trucks, car bodies are blocked up for underframe work. The cranes then move the trucks to the truck repair area. Trucks are torn down, inspected, and rebuilt. Repairs to the underframe, center plates, draft assemblies and train line are made while the body is blocked up. Rebuilt trucks are placed under the car and a tractor moves it across the transfer table and into the erecting shop for body work.



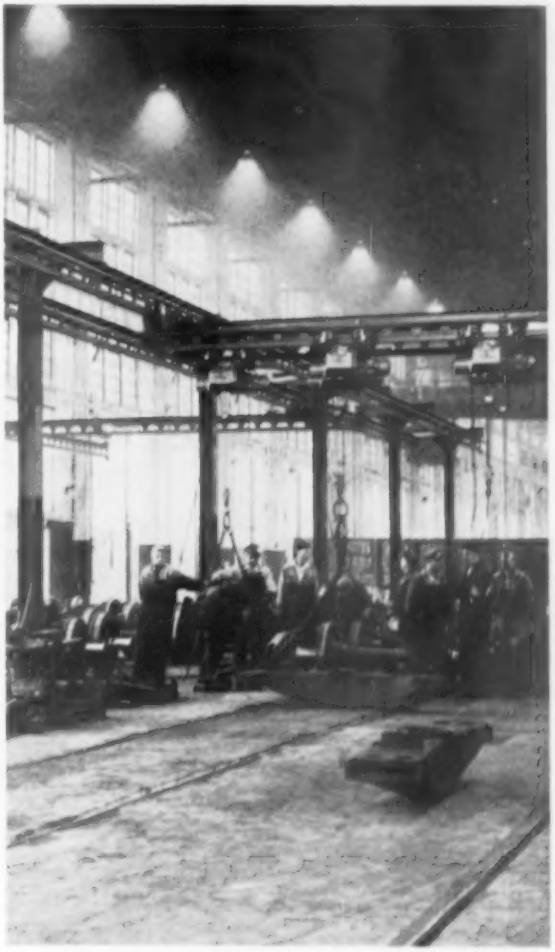
Car shop uses the former DuBois locomotive shop buildings. With the addition of a new paint shop, B&O has established a production-line car repair operation.

The underframe shop has a capacity of 31 cars. While steam locomotive repairs were being made, the 10 stalls at the east end of the building were extended toward the transfer table. This now provides capacity for two freight cars on each track. The width of the original bay allows only one car on each of the next 12 tracks. Because the track next to the extended section is used for material handling, the capacity of this section is 11 cars. Both the original bay and the extension have overhead cranes. The section formerly occupied by the eight transverse tracks at the west end of the shop has been completely rebuilt for truck repairs. The transverse tracks have been replaced with four longitudinal tracks spaced across the bay. Cleveland tramrails and crossovers were installed over the tracks and machines in this section. Sixteen electric hoists with capacities from 1,000 to 3,000 lb operate over them. In addition to disassembly and assembly, the hoists service wheel and journal lathes at the end of the shop, and a welding booth which reclaims worn truck parts.

The recently rebuilt tread and journal lathes turn only mounted wheel sets removed from cars. All new mounted wheel assemblies are received from the system wheel shop at Glenwood, ready for installation. DuBois has no boring or wheel mounting equipment. Axles are Magnafluxed when the wheels are turned.

Opposite the extended bay are blacksmith, pipe and fabrication shops and a welding booth where car parts are reclaimed. Center sills are spliced and center plates, strikers and draft castings are built up.

The erecting shop has the three original tracks. A fourth track was installed through the machine bay at the west side of the building. This track is serviced with a new five-ton overhead crane running a little over half the shop length. The three tracks in the original erecting bay are served by two 60-ton cranes for their entire length. Pits under these tracks have been filled and a concrete floor installed. Convenient compressed air and electric welding outlets have been installed in covered pits at numerous points along the erecting tracks. Induction type rivet heaters and rectifier welding equipment are used. Each track



Hoists and tramrails cover truck repair area where worn bolsters and side frames are built up, and axles and wheel treads are trued. Wide use is also made of reclaimed body parts.

Blocked up cars now fill the tracks of the former boiler and tank shop. The original overhead cranes have become a part of the new car repair operation.

Tractors move the cars into the underframe and erection shops. Car puller at the right front will be used to pull the erection shop production line.

has a capacity of 10 cars with adequate working room around the car at each station.

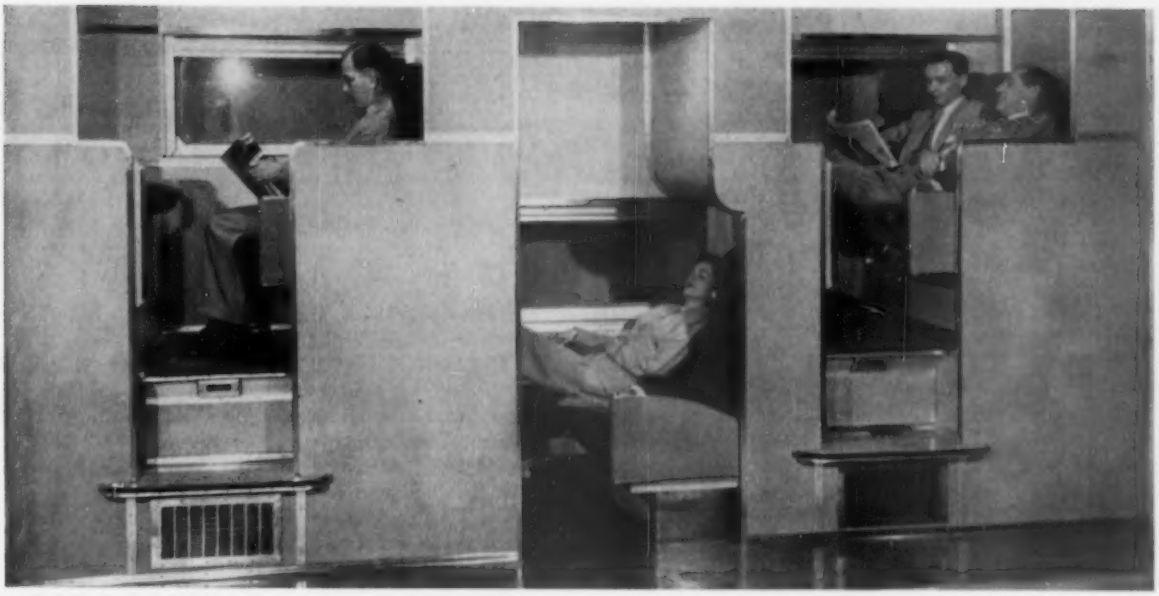
Along with the body, the brakes and safety appliances are completed in the erecting building. Air brake components are serviced at the system brake shop at Cumberland. Cars are moved to the paint shop located just to the north. The erecting shop has four electric car pullers. One is located between each pair of tracks at each end of the building and can move the line on a production repair set-up.

The only new building added during this conversion was the paint shop. This is an open sided structure, 280-ft long spanning the four tracks emerging from the erecting shop. It is equipped with 56 exhaust fans. Each track has a capacity of five cars under roof. Following spray painting, cars may be moved into the open for final stenciling and inspection.

Fabricated material is stored at many points close to the underframe and erecting shops. Locomotive cranes and power trucks combine with the overhead cranes to do the materials handling job in the new shop. This results in a minimum of interference on the floor around the cars being worked.

The former carpenter shop was rearranged to turn out car lumber and includes inside lumber storage. Modern locker and lunch facilities were installed. The power plant is equipped with two 600-hp gas-fired automatic boilers.

Production line facilities anticipate an output of 20 heavy car repairs daily. Light repairs known by the B&O as reconditioning repairs have occupied nearly all of the shop schedule. The reconditioning repairs turn out 45 open-top cars per day with a crew of nearly 400 men. The shop recently assembled 100 flat cars, using purchased underframes. This operation has been the only one in which a production line operation was achieved. Nine of these 53-ft 6 in., 70-ton cars were assembled daily.



Sit, sleep or recline . . . you can do them all in . . .

Pullman's Day-Nite Duplex Coach

Compared to Conventional DeLuxe Cars, New Layout Gives . . .

A new idea in coach accommodations has been devised by Pullman-Standard that should give the mechanical man something easier and cheaper to maintain at the same time it gives the passenger man a better service to sell.

The reduction in maintenance is expected to come from two sources. First, because of the duplex design, the new car can seat 56 people in nearly full recline vs only 40 under the same conditions in a regular single-line coach—therefore five such cars replace seven conventional ones, reducing running gear and other exterior maintenance by a third.

Second, interior cleaning and maintenance should be decreased by the extensive use of aluminum sheet and plastic coverings on the sides, ends and partitions of the car. The plastic is bonded to the wall structural surface under pressure for permanency and is not scratched even by most hard materials.

The 56-seat duplex car will probably cost about $20,000 more than a single-floor-level 40-seat de luxe coach—thus giving a more than third more seats for only about a sixth more cost. The total weight will also be increased much less than the seating capacity. AAR and RMS strength requirements will, however, be maintained in full.

Four men's and four women's private dressing rooms are available in the car and each is complete with hopper, washstand, dental bowl and mirror. The signs are reversible so that the eight can be made into any combination (e.g., 6 men's, 2 women's).

Extra large baggage and parcel spaces are located at

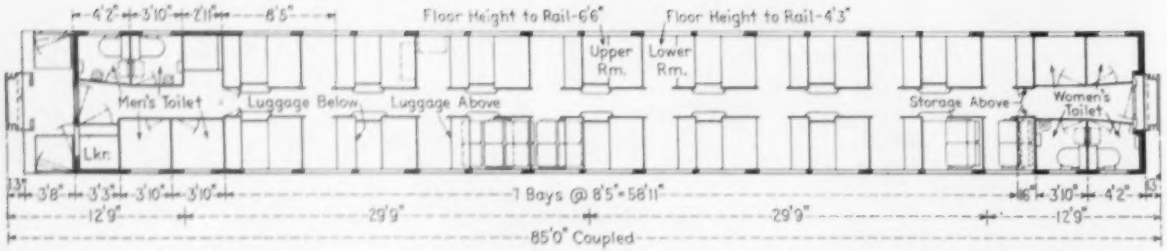
MORE

- ► Privacy and
- ► Washroom space
- ► Recline in the seats
- ► Room per passenger
- ► Passengers per car

BUT LESS

- ► Cost per seat
- ► Weight per seat

Chaise-lounge contour seats with elevated foot rests which are hinge-supported and fold out of the way when not in use, permit nearly full recline at night for passengers



the seats and large and heavy bags can be stowed easily and quickly. Space can also be provided for food and drink vending machines as a convenience to passengers and as an additional source of revenue for the railroads.

Deluxe seats in the upper and lower duplex rooms are of the individual reclining type. They have Latex foam rubber back and seat cushions, and are fabric covered. There are no center arm rests but each individual seat has an individual arm rest on the outside. Each seat has its own separate hinged leg rest for use when the seat is in the reclined position. Roomette type windows are provided in each accommodation.

Floors are rubber tile, and the entire car is insulated for both temperature and sound control. Windows are the sealed type with double glass. Each car has its own water cooler and drinking cup dispenser.

Air conditioning capacity is 8 tons with controls located on a single panel. Passengers can adjust air supply within individual seating areas by means of diffusers. The heating system is similarly centrally controlled with passengers having local manual control over specific areas of occupancy.

The Day-Nite-Duplex, while a new concept of luxury coach travel permitting nearly full recline at night in private or semi-private sections, imposes no rate or possible Pullman porter or Pullman fare controversy. It is a new coach accommodation and will not affect operation of section or roomette cars.

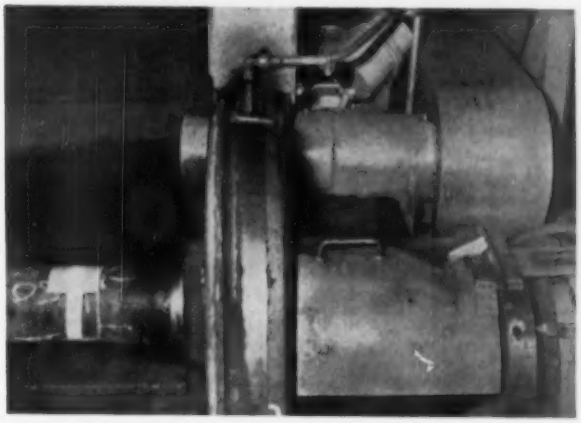
DRAWBRIDGE arrangement on that part of the scaffolding along the ends of the car is easily raised out of the way for operations on the end of the car

Car Men Modernize Their Own Production Setup

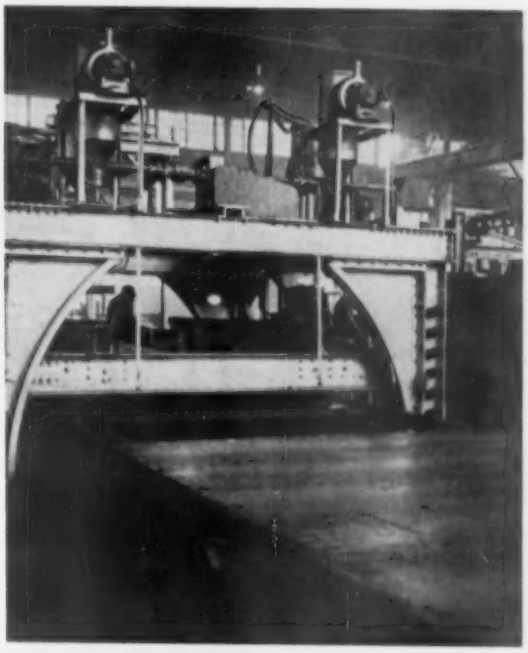
Faced with the alternative of being laid off for several months while their shop was being modernized or of doing the job themselves, the regular production workers at ACF's St. Louis plant switched temporarily from the building of freight cars to renovating their own shop. The result was a lower cost for ACF as well as uninterrupted employment for the work force. The procedure also gave the production workers a chance to include in the finished plant some of their own ideas based on their intimate knowledge of the work the plant would turn out.

The renovation started in April, 1954, and has cost $1.5 million to date. Total cost to provide the St. Louis area with this modernized facility will be about $2.5 million. Capacity will be up to 50 cars a day depending on the type.

Switching between types of cars to be built will be simple and inexpensive. Jig stands are movable and adjustable, and the fixtures themselves are saved for repeat orders of any given type car. Another interesting feature that combines flexibility with high production is a special block which positions the five tools needed

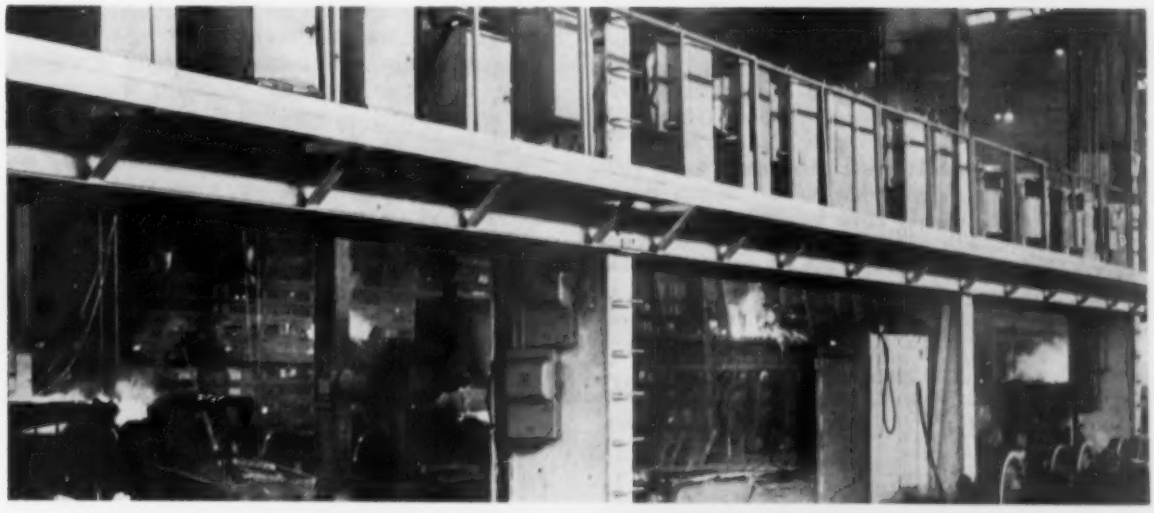


TREADS are cleaned up on all cast iron wheels in the wheel shop where six lathes, two burnishing machines and four boring mills turn out up to 210 wheel sets



THE HIGH DEGREE of mechanization extends to sub-assembly work like welding the side sheets to the side posts as well as to operations on the production line

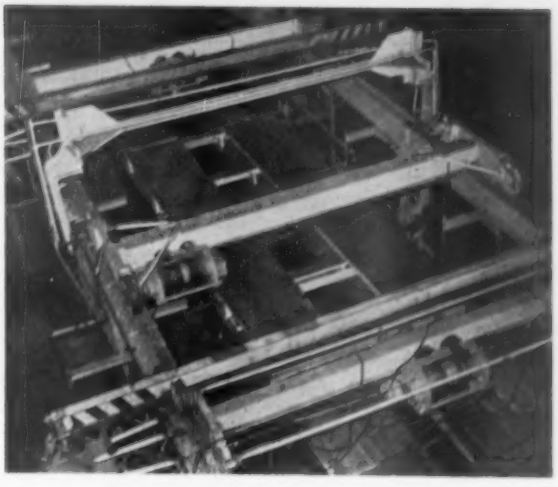
WELDING MACHINES are mounted on a balcony that runs along the production track and the leads are run underneath the floor to outlets for the operators, leaving the area around the erecting track uncluttered



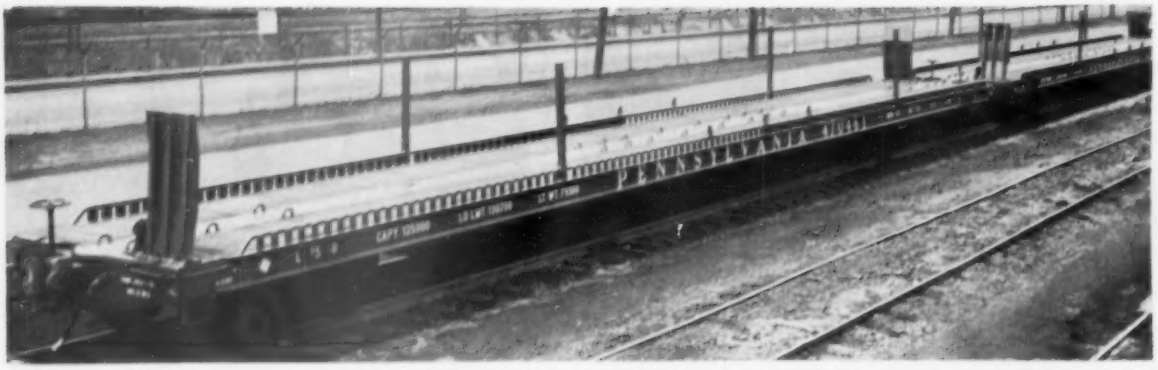
to complete all turning operations (journal, wheel seat, and all radii) on each end of the axle.

To set the tools for different sizes or types of axles, they are merely run up against a master axle guide and clamped in position. When on the machine, only the cross slide that holds the block needs to be adjusted for the proper diameter, and that only once each time a run of a different size axle is to be made.

Other features of the renovated plant are shown in the accompanying pictures.



HANDLING this set of interior scaffolding is but one of many tasks performed by the versatile system of small traveling cranes which run the length of the erecting track. Two hoists cover each work position. At the earlier stages each hoist feeds parts to the underframe, then the two team up to move the underframe to the next position. At the later stages one hoist extends beyond the rails to pick up sides, ends, ladders and other heavy exterior parts. Current is collected from below and the wire protected from cranes by an n-shaped cover



Two of the TrucTrain cars—each long enough to carry two standard trailers—ready for delivery to the Pennsylvania.

PRR TrucTrain Cars

The 75-ft flat cars put into the Pennsylvania Railroad's TrucTrain service between New York, Philadelphia, Pittsburgh and Chicago on March 3, 1955, were designed primarily for the safe, efficient and speedy handling of two highway trailers per car. The design, in which Bethlehem cooperated with PRR engineers, also provides for a secondary objective: namely, a car meeting AAR Loading Rule requirements and therefore suitable for general service. Two hundred of these cars were recently completed at the Bethlehem Steel Company's Johnstown, Pa., plant.

The car underframe is a welded structure using two 30 in. wide flange beams with top and bottom cover plates for center sills and 12-in. by 35-lb car building channels for side sills. Mayari-R low-alloy high-tensile steel was used in center and side sills, as well as in other parts of the structure subjected to high stresses.

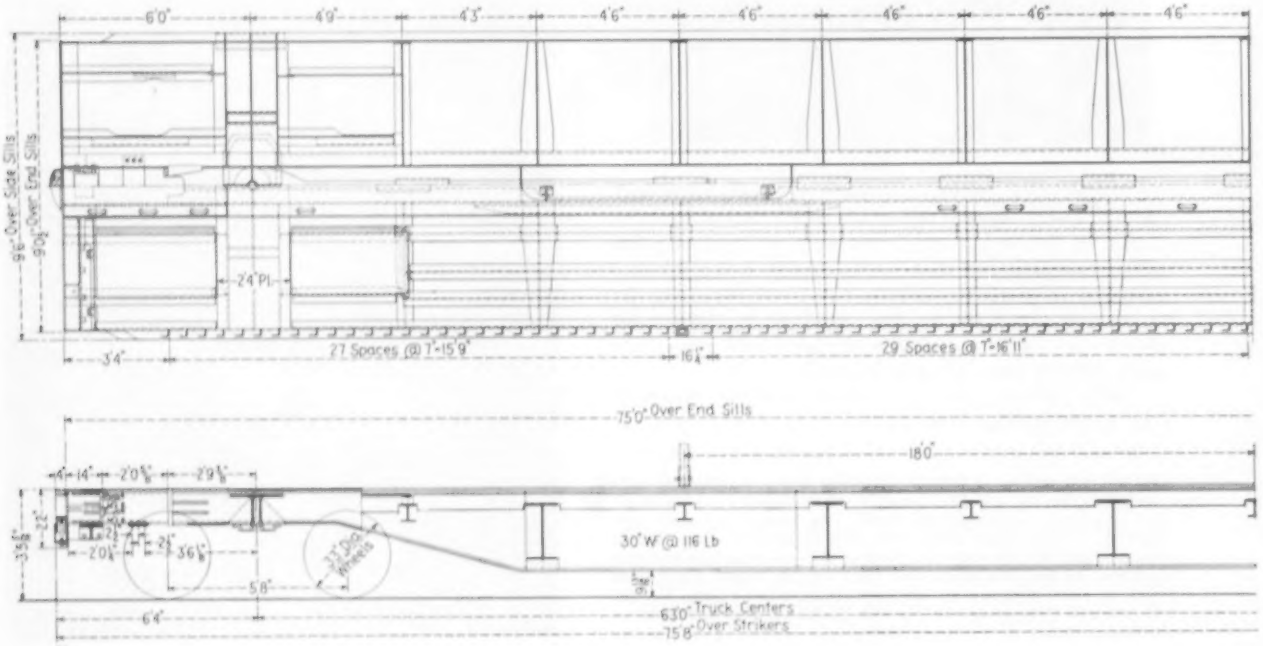
Cross members are of the welded web and cover plate type, except the cross ties, which are 6 in. by 15.5 lb wide flange beams.

Oak decking, 2⅜ in. thick, flush with top of side sill channel, extends between side and center sills and is supported on three rows of floor stringers, on each side of center sill, two of which are 4 in. by 8.2 lb Z sections. The stringers adjacent to the center sill are 6 in. by 15.5 lb wide flange beams; heavier stringers are required at this location to take the reaction from trailer supporting jacks. Decking is secured at side sill and inside stringer with watertight bolts and welding studs.

The side curbs which serve as a guide in spotting trailers and as an anchorage for trailer tie-downs are 2 in. extra heavy pipe supported on side sills by 3½ in. by 2½ in. by 5/16 in. angle columns.

A tool box with flush hinged lid is built into the center sill at each end of the car, where tie-down equipment, Duff-Norton jacks, wheel chocks, and jacking beams can be carried when the cars are in general service or moved empty.

The cars are equipped with AAB-1012 freight brake equipment with two reservoirs and two 10 in. cylinders,



PRINCIPAL DIMENSIONS AND WEIGHTS

Length over end sills, ft-in	75 0
Length over strikers, ft-in	75 8
Length between pulling faces of couplers, ft-in	78 4-3/4
Truck centers, ft-in	63 0
Width over side sills, ft-in	9 6
Width between curb rails, ft-in	8 10-1/2
Height—rail to top of floor—light car, ft-in	3 5-5/16
Height—rail to bottom of center sill, ft-in	0 9-9/16
Weight of trucks, lb	19,190
Weight of body, lb	60,210
Light weight of car, lb	79,400
Capacity, lb	125,000
Load limit, lb	130,000

one cylinder piloting a relay valve to supply air to the second cylinder. Two Universal drop staff type hand brakes, one located at each end of car, operate independently, one for each truck.

Each car is equipped with the following special equipment for securing trailers to the car:

Jacks, screw type: 4 front and 4 rear.

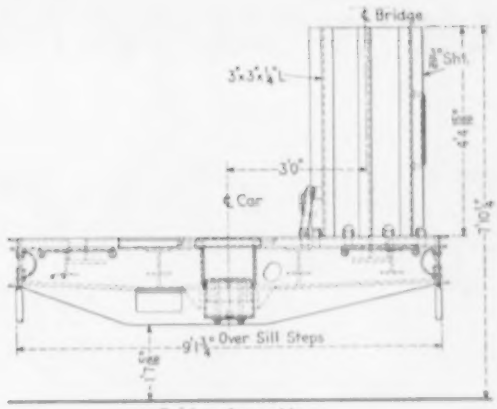
Tie-down units: 16, each consisting of $\frac{3}{8}$ in. high tensile chain, ratchet load binder, snubber, and hooks for attachment to trailer and car anchorage.

Jacking beams: 4, cast steel, self-locking.

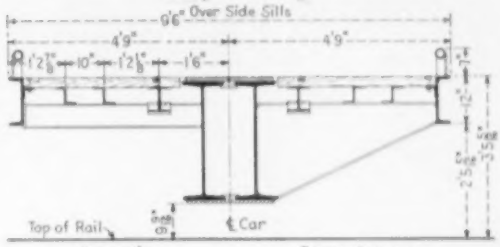
Wheel chocks: 4, with locking bars.

Transport of trailers from one car to another is accomplished by means of hinged bridge plates, located at diagonally opposite corners of the cars. When cars are moving these bridges are held in a vertical position.

These cars are equipped for high speed freight service, with Type F couplers, National Malleable Type MF 275-1 rubber cushioned draft gears and spring plankless $3\frac{11}{16}$ in. spring travel, SKF and Hyatt roller bearing equipped trucks equipped with 33 in. multiple wear steel, heat-treated wheels. Trucks are ASF pedestal type with A-3 ride control package and Buffalo unit brakebeams.

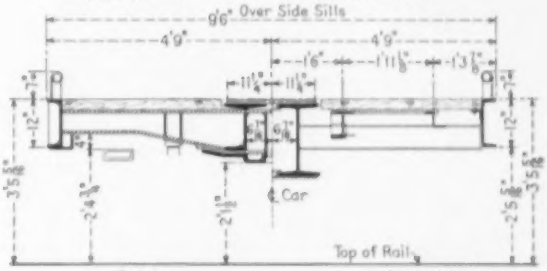


Bridge Assembly



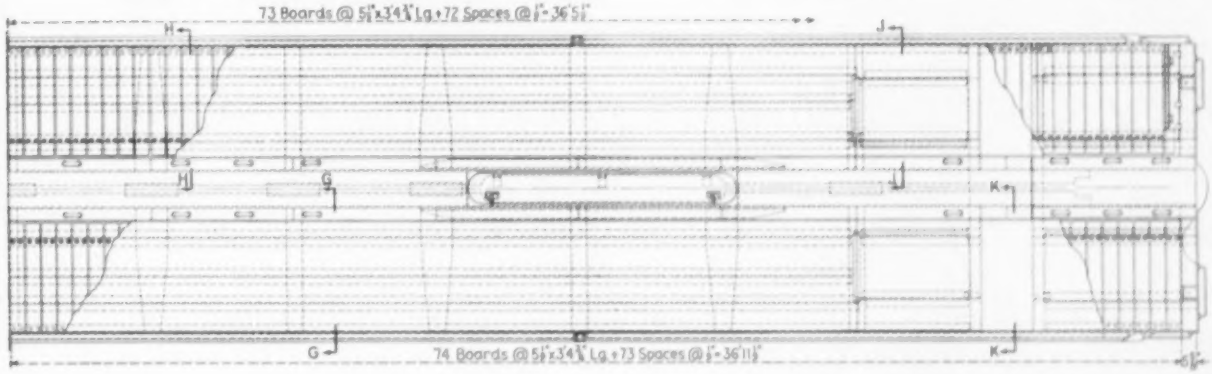
Crosstie Section G-G

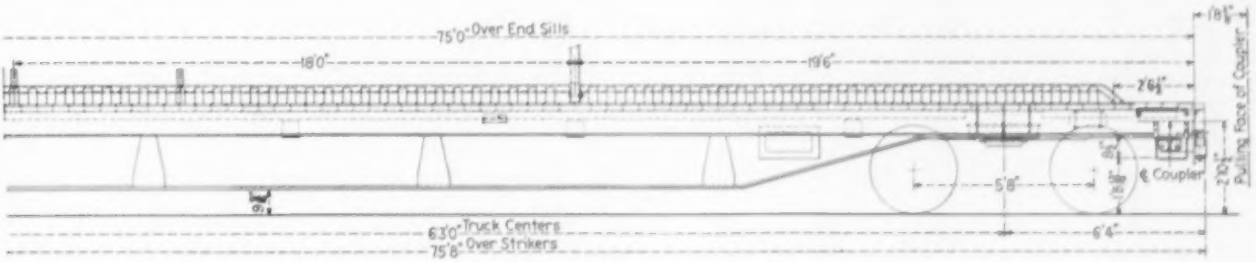
Cross-bearer Section H-H

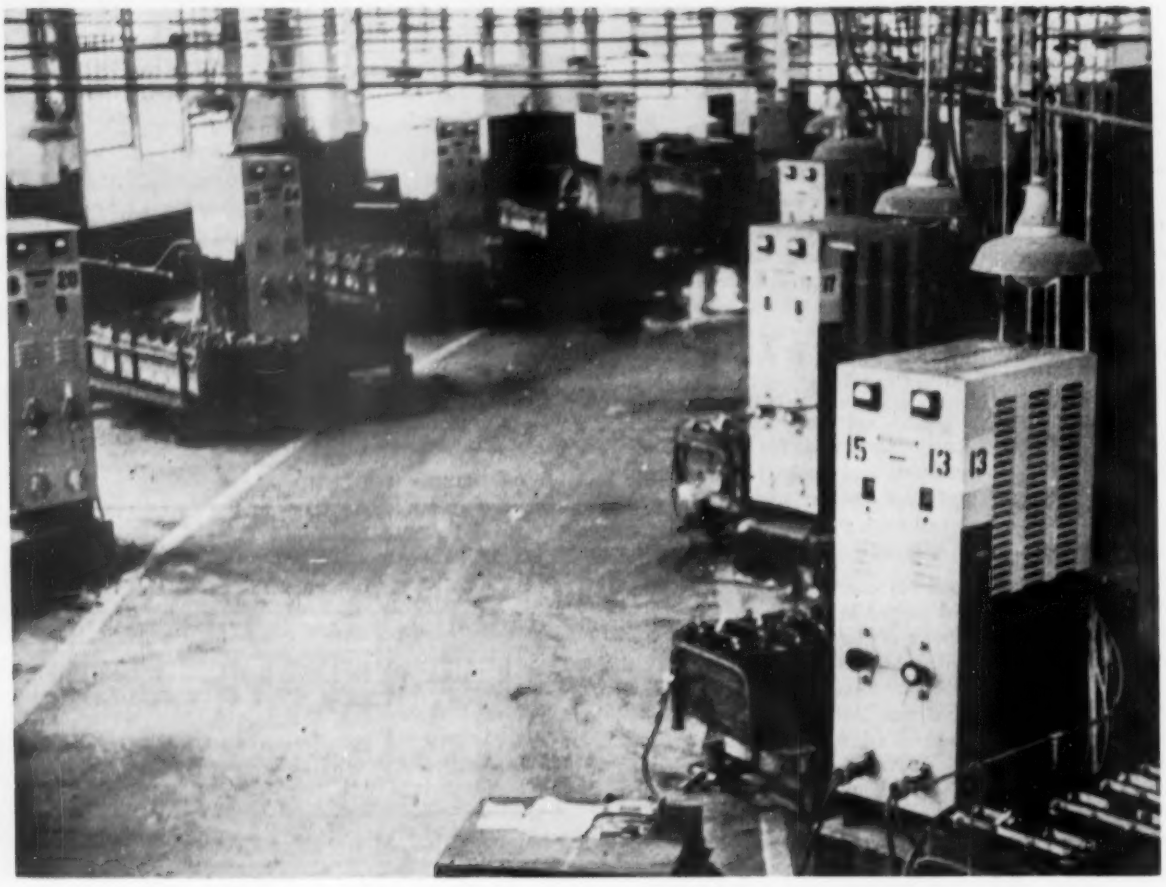


Bolster Section K-K

Crosstie & Wheel Section J-J







General view of the interior of the shop showing the arrangement of charging cubicles.

Every Railroad Must Have a Battery Shop

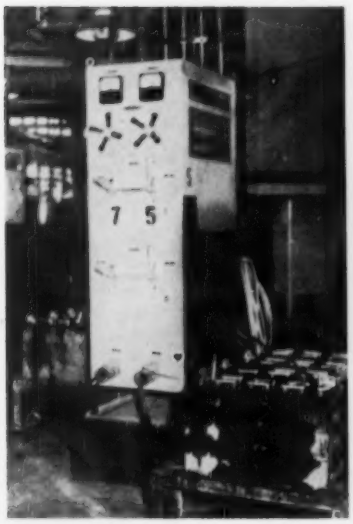
Operators using one of the portable discharge stands to check battery capacity.

On the Santa Fe at San Bernardino, a roundhouse was transformed into a first-class battery shop

■ All lead-acid storage batteries used on the Santa Fe's Coast Lines are overhauled in a newly equipped shop at San Bernardino, Calif. These include 32- and 64-volt batteries for both cars and locomotives.

New locomotive batteries normally stay in service two years. They are then brought into the shop for capacity tests and any necessary repairs. Succeeding shoppings are made at one-year intervals. Car batteries are sent to the shop at car repair periods.

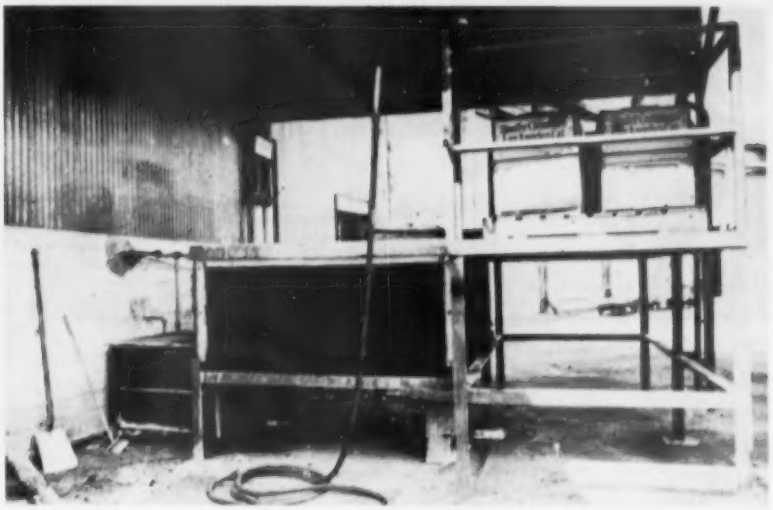
When a battery comes into the shop, measurements are made of open-circuit voltage and specific gravity. It is then flushed with distilled water and placed on charge. The initial charge is four times the eight-hour



In each cubicle there are two sets of resistors and controls and meters which may be used for charging or discharging.

The shop is equipped for all types of repair work.

A lead-burning torch doubles as a sealing tool.



Acid purchased in carboys is mixed with water to make electrolyte in an open shed outside the shop.

rate, and this is continued until the temperature of the battery rises to a value between 115 to 120 deg F. The charge is then reduced to the finishing rate and is continued until the cadmium voltage readings of the pilot cells are reversed. The battery is then said to be standardized.

The battery is then left on open circuit overnight and the next day is given a capacity discharge test at the five hour rate. If the voltage is 1.83 volts per cell at 80 per cent of discharge, it is recharged at the finish rate and returned to service. If it fails to meet this specification, it is given a shopping.

The shop has 20 charging cubicles each of which may be used to charge two batteries. Power is supplied to the cubicles by overhead lines and charging current is controlled by resistors in the cubicles. Most of the cubicles may also be used for discharging batteries and there are, in addition, seven portable discharge stands.

New batteries and reconditioned batteries awaiting service are kept in a fully charged condition by means of an automatic constant-voltage battery charger known as a Flotrol. It is a rectifier with a saturable core reactor which maintains precise voltage—35 volts—independent of load.

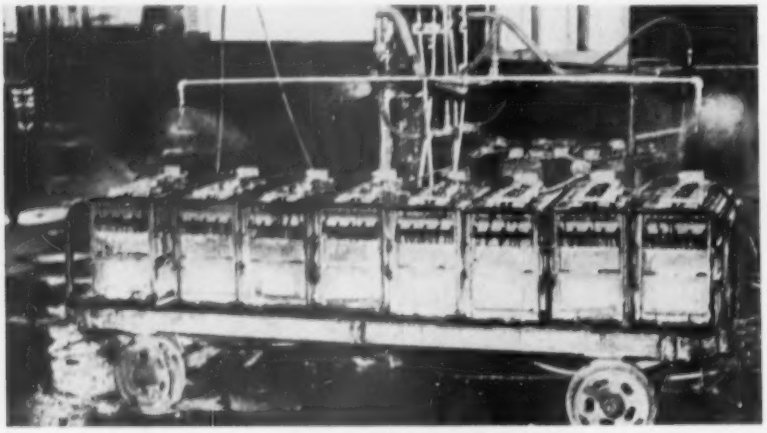
To reduce the time required for regular charging and permit higher charger rates in hot weather, batteries are vapor sprayed during charge. This is accomplished by three spray heads over each battery. The spray is little more than mist and use of water is very small.

The shop occupies 12 stalls of an enginehouse originally used for steam locomotives. The ceiling has been painted white, side walls are a sea foam green, with a five-foot maroon strip along the lower edge. The floor is covered with an acid, resistant mastic.

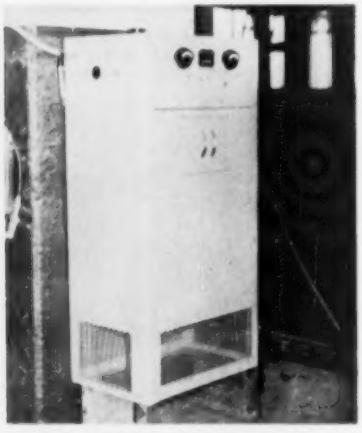
A pressurized generator room is built into the roundhouse, along the inner edge. Ventilating air is brought

Electrolyte and distilled water are stored on a balcony from which they are supplied to the batteries by gravity.

Emergency showers and barrels of soda are placed at strategic points around the shop.

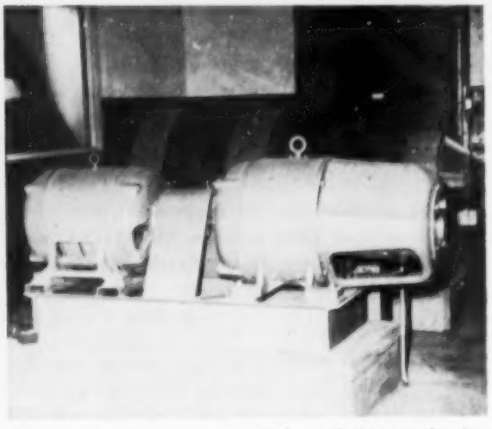


In hot weather, water sprays prevent overheating of batteries on charge.



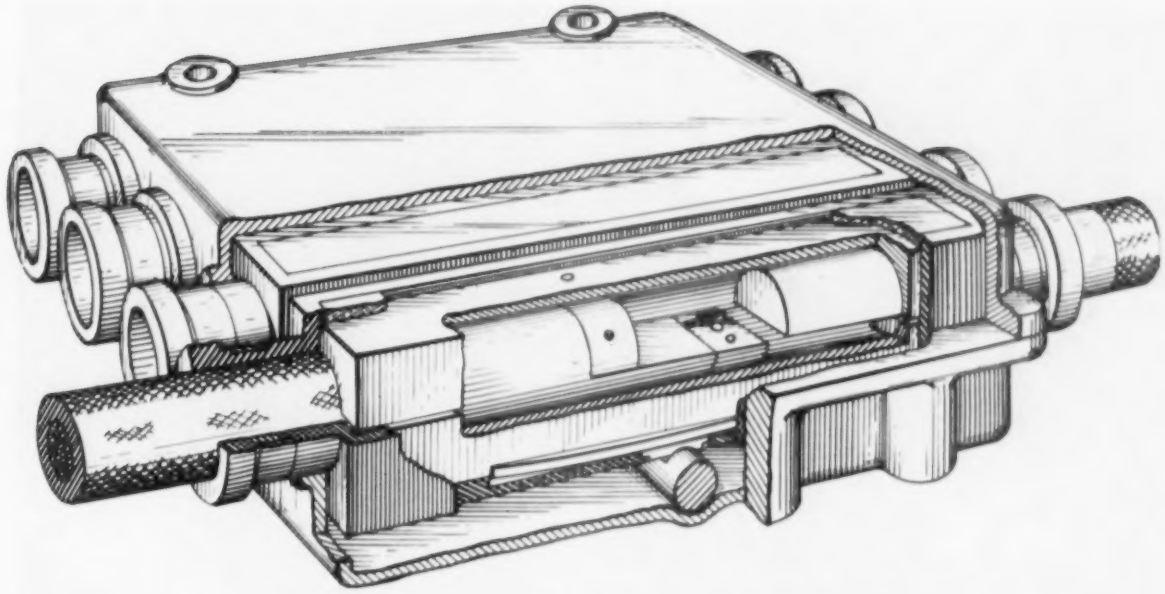
The constant-voltage rectifier used to keep new and repaired batteries in top condition.

New and repaired batteries on the 35-volt circuit, ready for service.



The two motor-generator sets which supply battery charging current.

in through the roof by a motor-driven locomotive fan. Battery charging current is furnished by two motor-generator sets. One supplies 500 amp at 90 volts, and the other 2,000 amp at 50 volts. The 90-volt machine is used for charging locomotive batteries. These machines supply the charging cubicles through overhead loop circuits. Each cubicle is fitted with Allen-Bradley resistors controlled by thermal breakers, and carbon-disc variable resistors. Each cubicle has two ammeters used for both charging and discharging. The shop is equipped for all repair work including lead burning, sealing and rebuilding and replacing of elements and containers.



Operating principle of the switch is shown by this cutaway section of the type used for EMD style clasp connectors

Motor Disconnects Aid Maintenance

Leads are protected from chafing and may be connected or disconnected in minutes.

■ A new type of quick-disconnect for diesel locomotive traction motor leads has been on test for the past six months in passenger service on western roads. During this time, it accumulated about 123,000 miles of service. Motor leads were removed each month in the course of the test and all connections checked and leads inspected.

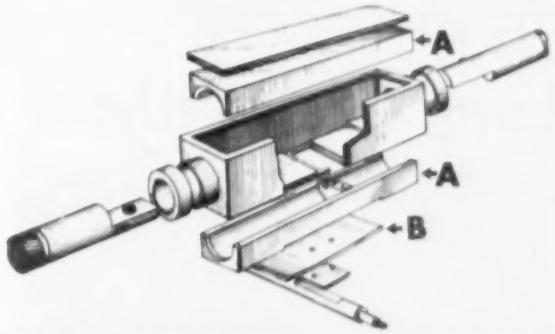
At no time was any difficulty experienced with the application. Shortly after application, the locomotive unit had a negative wire burned open in the trainline receptacle when running as the third unit. This caused the reverser to throw and did serious damage to the traction motors, but with no damage to the switch.

The device consists of a water-tight aluminum casing weighing 43 lb and measuring 12¼ in. by 13⅝ in. by 3 15/16 in. The aluminum is anodized and other metal parts are cadmium plated to prevent corrosion. All contacts are silver plated and held together by mechanical pressure to eliminate loose or hot connections.

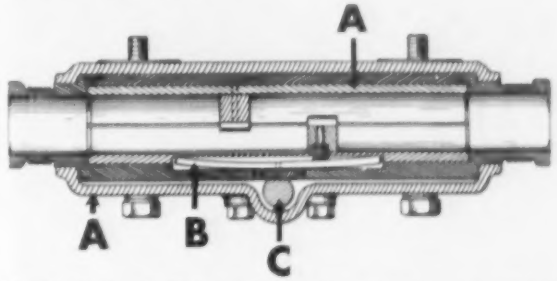
The quick-disconnect switch requires no auxiliary parts to adapt it to any existing make of diesel unit. Different models of the basic unit fit the different types of connector used. The unit is mounted to the underframe and is completely watertight. The latter feature eliminates the need for insulating tape over the area around the connections, and saves the time formerly required to remove and re-apply such tape each time the leads are broken. The watertight feature also eliminates the grounds that are experienced with the conventional connections when insulation ages and deteriorates.

Connection is made by simple movement of the handle. This gives a positive pressure connection (approximately 850 lb), and locks against road shock and vibration. Neoprene bushings where the cables enter the housing prevent chafing the insulation in this location.

The switch is manufactured by the Torman Company, 8119 Lake Street, River Forest, Ill.



One unit of the switch showing the contacts A which are bored out to the O.D. of the connectors and which clamp them by pressure applied through spring plate B



Turning the handle 90 deg turns cam C, pushing against the spring plate B and squeezing the contacts A tightly around the connectors

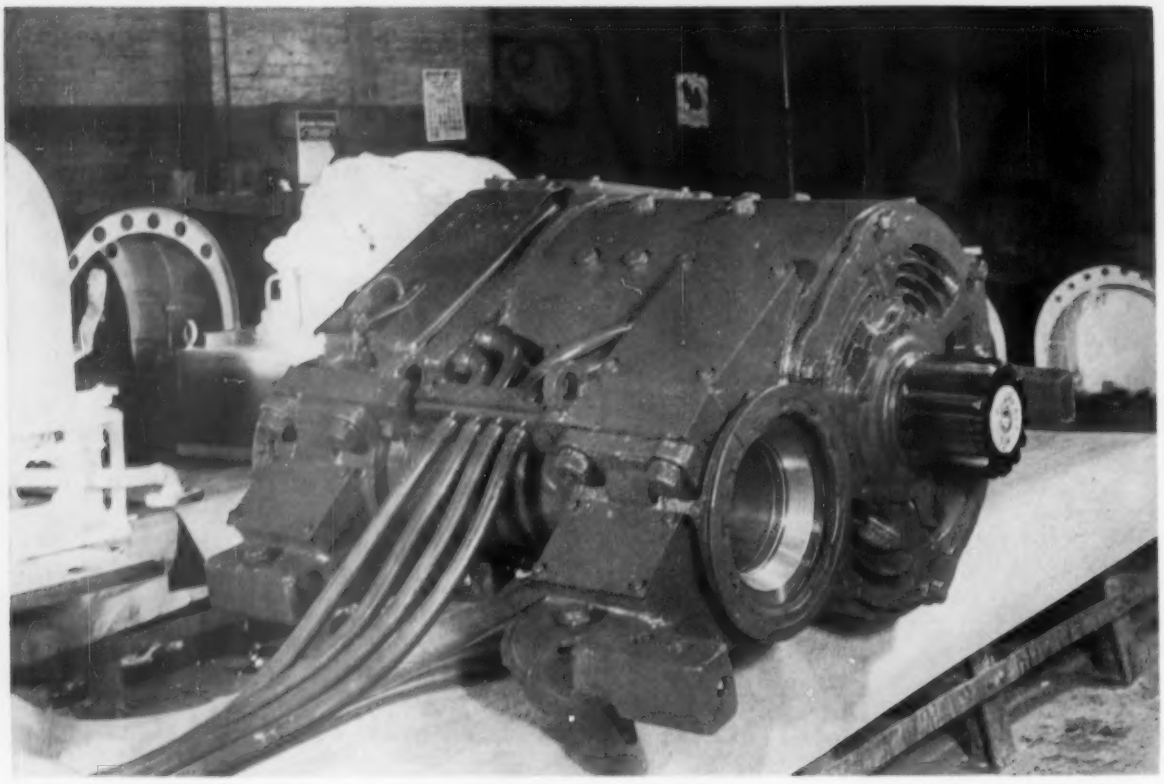


Fig. 1—Typical axle-hung traction motor.

Long Life Without Failures for Gears

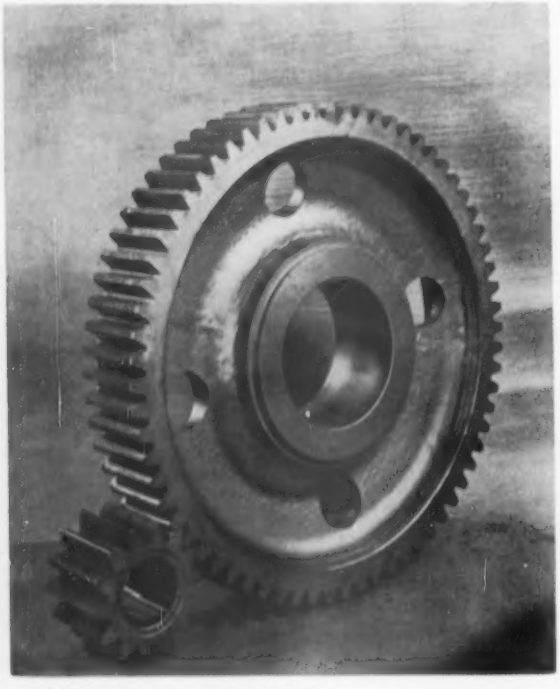


Fig. 2—Traction motor gear and pinion.

Different contours on opposite sides of pinion teeth assure wide tooth contact with little wear and few fatigue or shock failures

By W. P. WELCH and M. C. WINSTANLEY
Westinghouse Electric Corporation
East Pittsburgh, Pa.

■ Locomotive gearing on present day electric and diesel-electric locomotives operates under very high tooth loading when compared with almost any other type of industrial gearing. On diesel-electric locomotives, the traction motor is generally axle-hung, and is typified by Fig. 1. Spur gearing of relatively coarse pitch (2 to 3 diametral pitch) is employed, giving a reduction ranging from 4.5:1 for freight locomotive applications (Fig. 2) to 2.5:1 for high-speed passenger locomotives.

Although this gearing is usually hardened to a high hardness level for strength and wear resistance, and then finished by grinding to obtain highly accurate tooth profile and spacing, the severe service imposed has resulted in gearing failures, especially where the locomotives are used in heavy, high tractive-force, freight operations. The problems of wear, excess pitting and scuffing of the teeth are serious and limit the useful life of the

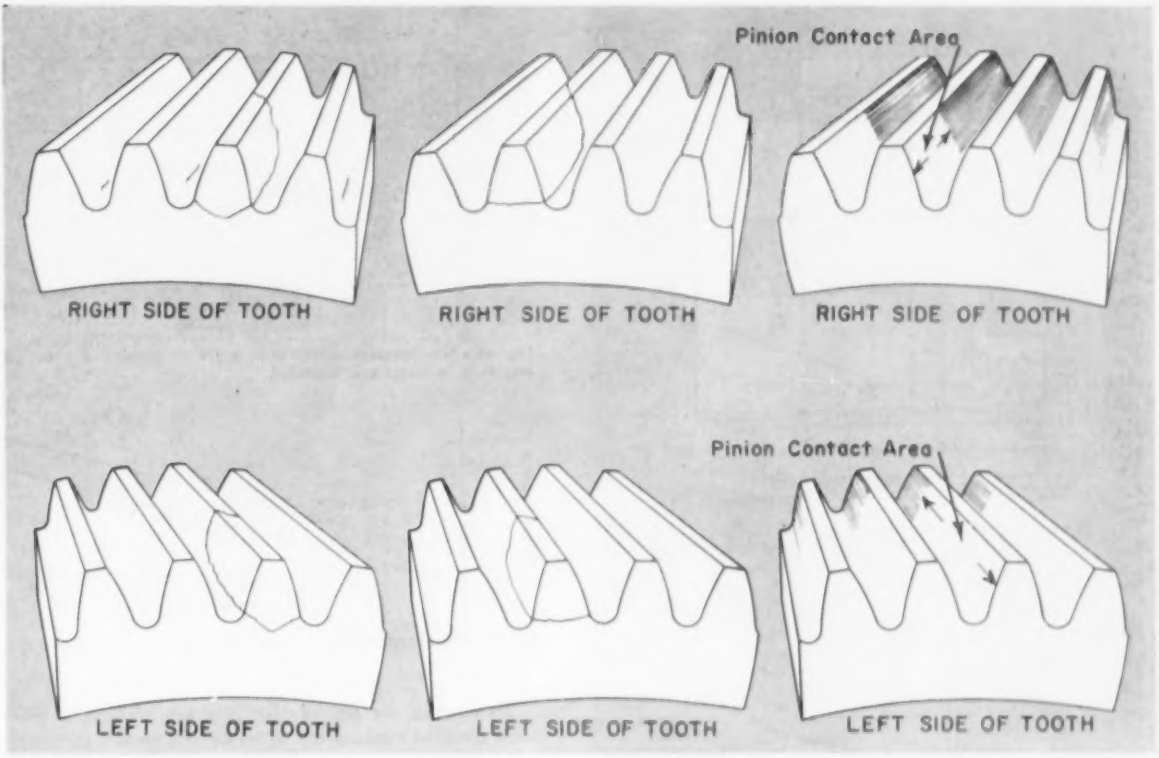


Fig. 3A (left)—Typical fatigue crack pattern. Fig. 3B (center)—Fracture pattern due to shock or impact load. Fig. 3C (right)—Wear pattern on axle gear due to operation with straight ground pinion.

pinions and gears, but it is the occurrence of tooth failures that is of really major consequence, since it is difficult to avoid road breakdown from this cause by preventive maintenance.

Wear limits have been established for most types of railway pinions and gears, and if the gearing is condemned in adherence to these standards no operational trouble is to be expected from wear, except possibly in the case of locomotives in long-distance high-speed service where excessive vibration due to worn tooth profiles may damage other parts.

Usually, cases of excessive rates of wear can be traced to one of three causes: (1) not maintaining sufficient lubricant in the gear case; (2) abrasive matter in the lubricant; or (3) excessive clearance in motor axle bearings. Poor maintenance of gear cases and their seals can be the obvious reason for either of the first two causes.

Tooth breakage is sometimes a catastrophic type of failure resulting in a road breakdown of the locomotive, this being virtually always so when the failure is on the pinion. Tooth failures generally fall into one of two types:

1. A fatigue failure, one that results from many thousands of load applications of a value slightly higher than that which the tooth can endure.

2. A shock or impact failure, due to a tooth load much higher than the endurance strength of the tooth, applied perhaps only once or perhaps 10 or 100 times.

The unique aspect of the fatigue failure is that it starts as a very small crack, which progresses in size under additional load cycles, until finally a portion of the tooth breaks out. Figure 3A shows how a fatigue fracture progresses across the base section of a tooth, the initial direction of the path being perpendicular to the tangent to the tooth fillet at the point of origin. Contrary to what might be guessed, the cracks do not start at the extreme end of the tooth, but at a point three-fourths to one inch in from the end of the tooth.

A shock failure displays a different pattern, as shown in Fig. 3B. Here the path of the fracture tends to take the shortest distance across the base of the tooth. Moreover, the familiar indications associated with the progressive fatigue failure do not appear on the fracture surface, for in a shock failure the fracture occurs very suddenly.

Locomotive gearing, in addition to being heavily loaded, is forced to operate under severe conditions of misalignment on account of the mounting of the axle-hung traction motor. This leads to very poor load distribution across the face width of the teeth, resulting in a high concentration of load on the motor side of the pinion and the gear. The tooth stresses are correspondingly increased in the vicinity of the load concentration, which is borne out in service by the fact that until recently, fatigue cracks have always begun on the motor side of the gear or pinion. Figure 3C shows a typical wear pattern obtained with normal, parallel ground gears and pinions. It has been estimated that, due to this effect alone, the peak stresses are increased to almost 300 per cent of what they would be if the gearing were operating under conditions of perfect alignment in which the load is distributed uniformly across the tooth's face width.

For eight or ten years in this country, pinions having

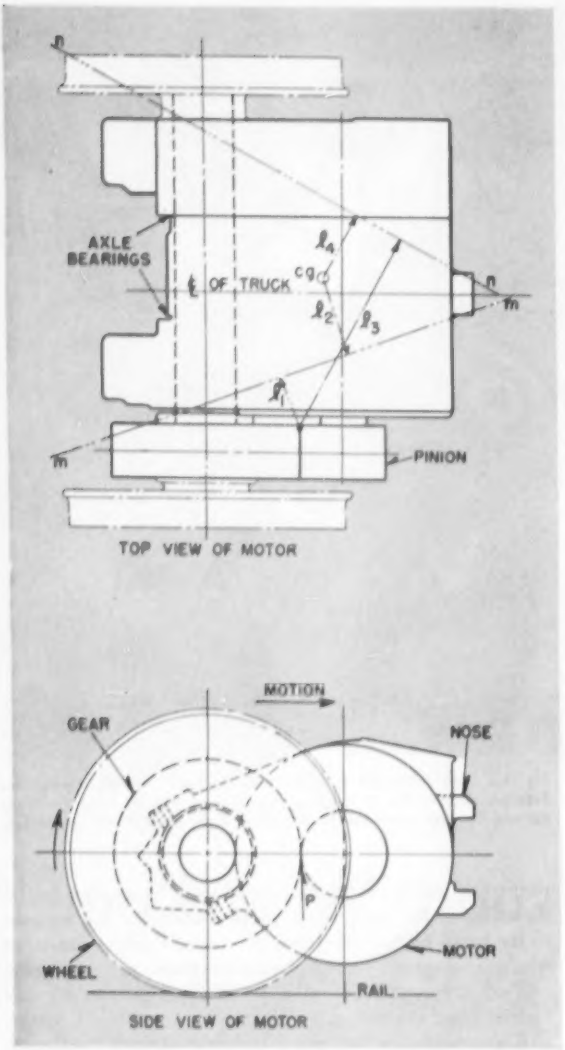


Fig. 4A—Condition causing tilting of motor frame in clearance of axle bearings.

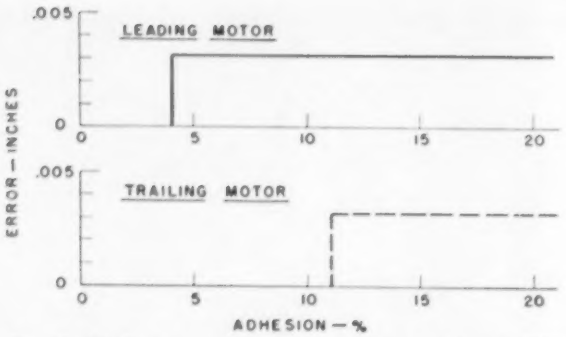


Fig. 4B—Misalignment across face width of gearing due to .020" clearance in motor axle bearings.

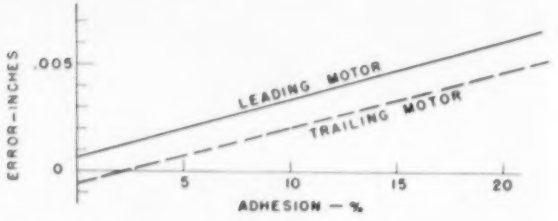


Fig. 4C—Misalignment due to shaft deflection.

teeth uniformly tapered in width have been used to alleviate this condition. However, this simple provision is not enough, as will be seen from the discussion that follows, so that only a very partial improvement can be gotten with a uniform taper of the teeth. More recently, a refinement of this scheme has been introduced, by means of which very excellent conditions of alignment are attained. Comparison of these newly developed pinions with the older, uniform taper pinions, by means of careful observations of wear patterns on gears in service on locomotives working in heavy duty, show that the new pinions are a major advance in achieving good load distribution across the entire face width of the gearing.

The refinement consists of grinding a different taper on one side of the tooth as from that on the other side of the tooth. The difference in taper, however, is major. One side of the tooth has very little taper, while the other side has what heretofore would have been considered an excessively large taper.

To explain the reasons for this new design, a somewhat detailed explanation of the misalignment conditions on the axle-hung traction motor will have to be given. The major components contributing to this misalignment are:

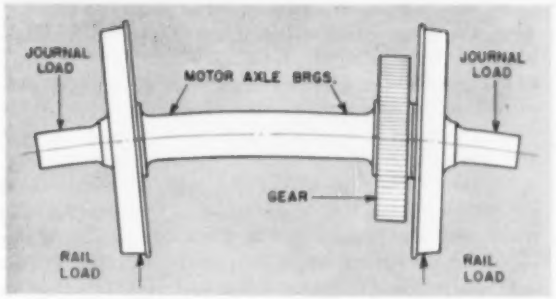
1. The tilting of the motor frame in the clearances of the motor axle bearings.
2. The bending of the armature shaft as caused by the bearing tooth load.
3. The tilt of the gear due to the bending of the locomotive axle as caused by the locomotive weight.

It is evident that (1) and (2) depend upon the tractive force being exerted by the locomotive, but factor (3) does not.

Motor tilt in axle bearings is shown in Fig. 4A. When the locomotive is working in a direction such that the motor is leading the axle, the tooth load on the axle gear is downward. This tends to rock the motor about the axis *N-N*, which passes through the opposite axle bearing and the motor nose. This tilting force is resisted by the weight of the motor acting at the lever arm *LA*. When the tooth load *P* and the corresponding tractive force of the locomotive build up to a sufficiently high value, the motor weight is overcome and the frame tilts through the bearing clearance. This, of course, creates a misalignment across the face width of the gearing.

The amount of this error depends upon the clearance in the motor axle bearing. When new, this is as low as .010 in., when worn, as much as .060 in. The solid line in Fig. 4B shows the amount of this error for .020-in. clearance in a typical case when the motor is leading the axle. Below a tractive force corresponding to four per cent adhesion, no tilting occurs. Above four per cent adhesion, the motor operates in the tilted and misaligned condition.

When in Fig. 4A, the motion is to the left, the pinion pushes upward on the gear, tending to rock the motor about the line *M-M*. Since the moment arm in this case



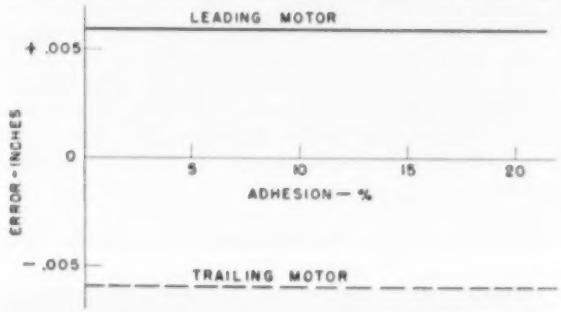


Fig. 5B—Misalignment of gear due to bending of axle.

is very short, *L1*, compared with *L3*, the tooth load *P* has to build up to a much higher value before tilting occurs. This is shown in Fig. 4B by the dotted curve, which comes into play at tractive force corresponding to 11 per cent adhesion.

The misalignment error in Fig. 4B, and in the other figures is expressed in inches misalignment across the face width of a typical gear or pinion.

The second component is the error caused by the bending of the motor shaft because the pinion is overhung. The amount of this misalignment obviously is proportional to the tooth load and is modified only by the deflection of the shaft due to the armature weight. This causes the results, as presented in Fig. 4C, to be slightly different for the two directions of armature rotation.

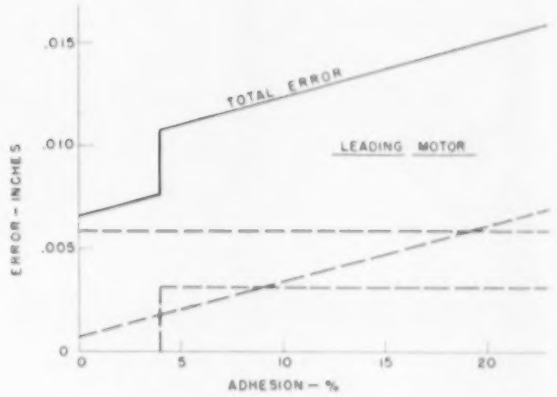
The third large factor is the one that is usually overlooked. Figure 5A shows in a greatly exaggerated manner the deflection curve of a locomotive axle when supporting the weight of the locomotive. The axle gear obviously tilts due to being mounted adjacent to the wheel, and the amount of this tilt can be readily calculated from the axle dimensions and the journal box loading.

The curves in Fig. 5B show two unusual aspects of this misalignment. First, it does not depend upon tractive force. Second, it causes a concentration of tooth load on the motor side of the gearing when the pinion pushes down on the gear, but it loads the wheel side of the gearing when the pinion pushes upward on the gear. Thus, in the first case, the error adds to the previous two errors, but in the second case this error is subtractive.

All three components are added algebraically in Fig. 6, for a leading motor, and for a trailing motor. In each diagram, the three components are shown as dotted lines.

These diagrams show that the misalignment error increases rather rapidly with tractive force, taking a jump at the point when the motor tilts through the axle bearing clearance. Note that the error starts out with a

Fig. 5A—Bending of locomotive axle due to locomotive weight.



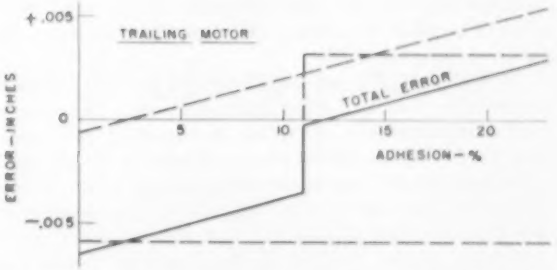


Fig. 6—Total misalignment across face width of gearing for a typical traction motor. Motor leading the axle.

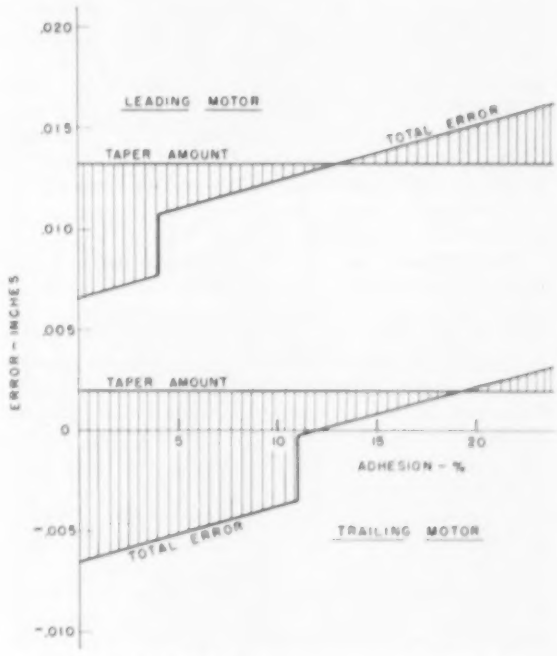


Fig. 7—Effect of selected taper amounts on reducing the net misalignment, which is shown by shaded areas.

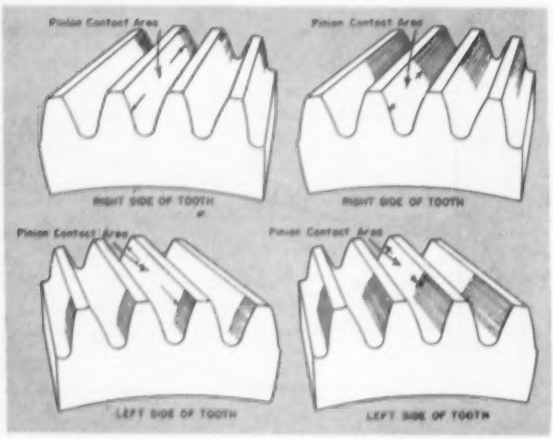


Fig. 8A (left)—Wear pattern obtained with Heli-taper pinions. Fig. 8B (right)—Wear pattern obtained with pinions having uniformly tapered teeth.

negative value for the trailing motor case. Thus, it is evident that 100 per cent correction of this total error cannot be made by altering the tooth shape on either the gear or the pinion.

A highly significant fact, however, is that the tooth stresses are low at the low tractive forces. The area in which misalignment correction is important and essential is the region above tractive forces of 10 per cent adhesion. In this region, the misalignment errors do not vary over too wide a range, and the intelligent selection of a taper amount, one for each side of tooth, from diagrams similar to Fig. 6, can produce tremendous reductions in peak tooth stresses.

It is necessary to apply the taper only to the gear or to the pinion. Since the pinion has fewer teeth, in practice, the taper is applied to the pinion teeth, this being the less costly procedure. Shown in Fig. 7, is a replot of the two total error curves with the selected taper amounts shown on the curves as straight horizontal lines. For any tractive force, the net misalignment with the taper ground pinion is the difference between the total error curve and its mated taper amount curve (or straight line). Note that for the case where the motor leads, the right side of the pinion tooth is the working face, whereas for the trailing motor, the left side of the tooth is the working face, viewing the top tooth from the motor side.

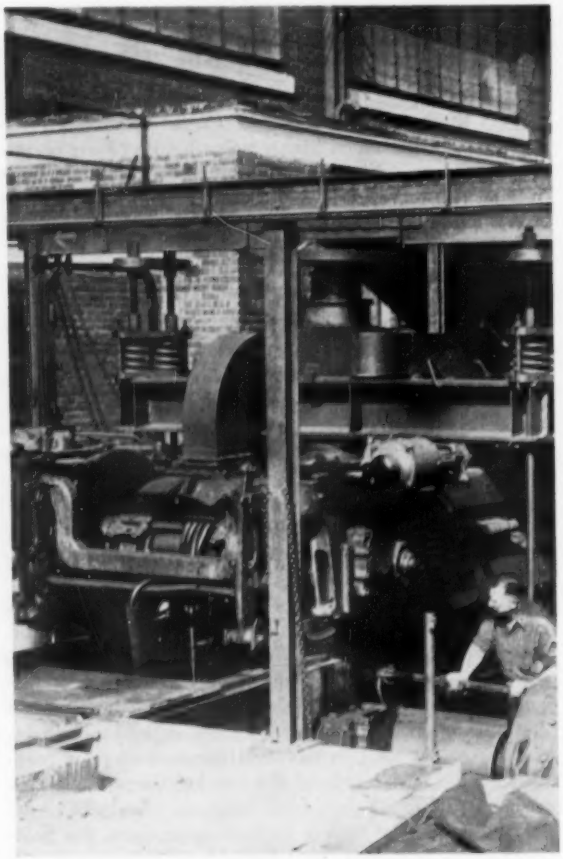
The new taper ground railway pinions are produced on a generating-type involute grinding machine which grinds both sides of the tooth space simultaneously. The taper is gotten by two angular adjustments. The first is a slight inclination of the line of travel of the grinding wheel, so that the wheel cuts deeper on the motor side of the pinion, thus cutting a tooth having a uniform taper across the entire face width. The second adjustment is a setting causing the teeth to be cut on a very slight helix. This adds to the uniform taper on one side of the tooth, and subtracts from the taper on the other side. By these means, any desired combination of tapers can be manufactured.

On an actual pinion, although the taper is small, it may be observed visually on the top land of the teeth. Of course, it is impossible, except by precision measurement, to ascertain what proportion of this taper is on the right side of the tooth and what proportion is on the left side.

By now, numerous observations of wear patterns have been made on locomotives using this new Heli-taper pinion. Minor adjustments in taper have been necessary to achieve 100 per cent face width contact on both sides of the teeth, although the tapers chosen for the first models from an analysis similar to that given above, were very nearly correct.

Figure 8A is a sketch of the type of wear pattern achieved with the Heli-taper pinion. This may be compared with the pattern of Fig. 8B for a pinion of uniformly tapered teeth, where it is easily seen that there is under-correction on the right side and over-correction on the left side.

A conservative estimate of the benefits to be gained from the Heli-taper pinion is that axle gear life will be tripled over the life previously obtained with straight ground pinions. Pinion breakage should be reduced to a bare minimum and the life of the pinions will in almost all cases be terminated by wear rather than by other causes.



An outdoor torture pit for testing new traction motor designs is helping engineers at the General Electric Company's Locomotive and Car Equipment Department at Erie, Pa., solve motor performance problems without having to test equipment on a locomotive. The motors are mounted in a locomotive truck and are put through all types of operating tests. A sequence timer, which automatically controls speed and power, subjects the motors to a 24-hr-a-day cycle simulating a typical locomotive run. This grueling operation shortens the time required to perfect new traction motor designs.

Passenger train hauled by one of the present Class GG1 locomotives used in New York-Washington and New York-Harrisburg, Pa. service.

PRR Seeks to Improve Motive Power

■ The Pennsylvania is now in the midst of a study to determine how to improve and better utilize the various types of motive power now in the service of this railroad. The study is being made jointly by the Pennsylvania, with the General Electric Company and the Westinghouse Electric Corporation, and with the firm of Gibbs and Hill, consulting engineers, acting as a catalytic agency to coordinate all phases of the work.

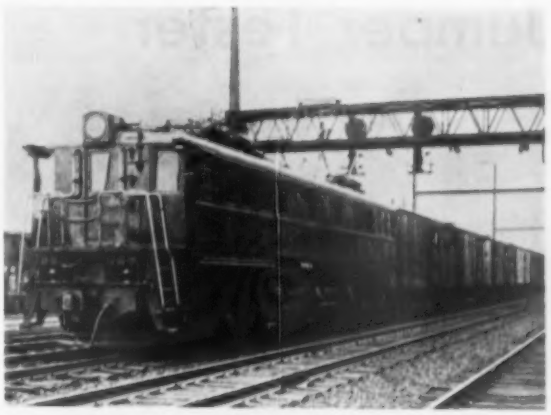
The primary purposes of the study are to determine the possibilities of developing improved electric freight and passenger locomotives, and in determining the potentialities of a combination diesel-electric locomotive which can operate both as a diesel locomotive and as a straight electric locomotive obtaining power from an overhead contact system.

In addition to this, the Pennsylvania is exploring the possibilities of a high-speed multiple-unit car for the "Clocker" trains which run between New York and Philadelphia, Pa., and for service between New York and Washington, D. C. Another part of the study includes an m-u car which may be used more economically than those now in suburban service.

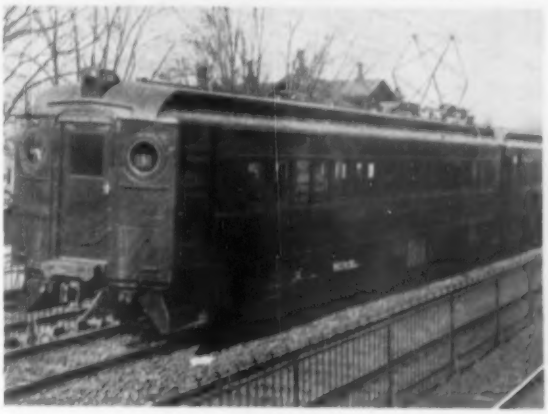
The study also is investigating the PRR passenger train operation on the New York and Long Branch to determine if the answer might be electrification, or a substitution of diesel locomotives for steam in the Long Branch territory.

Previous electrification studies made in 1947 have indicated that the Middle Division, Harrisburg, Pa., and Enola, Pa., to Altoona, Pa., might be operated electrically without any great increase in motive power.

Accordingly, the present study will determine whether or not the economics of such an arrangement would release sufficient diesel power to postpone the purchase of additional diesel locomotives for use in the territory west of Altoona, Pa.



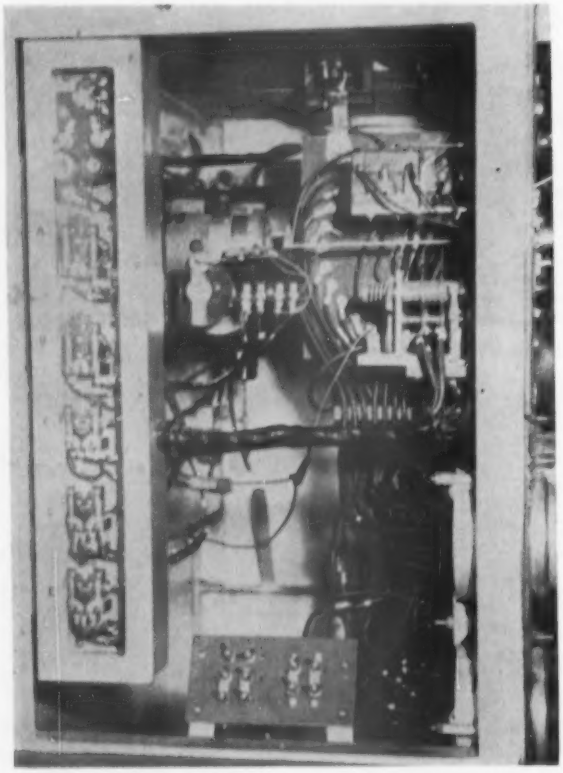
Improved freight locomotives are an objective of the study.



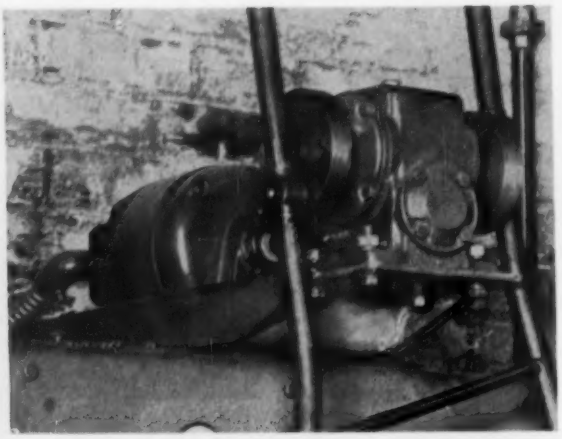
A more economical type of m-u car is being considered, to replace these now in service in the suburban areas.

Walter Weitzel, who operates the machine, makes a current setting.

Automatic Jumper Tester



A panel removed from the left side shows location of relays at left. Connection straps at bottom make correction for reversed contacts, permitting automatic sequence operation.



The driving mechanism insures a positive back and forth movement of the cable.

■ A jumper tester developed on the Great Northern is unique in that once a test is started, the machine automatically runs the test from one conductor to another, until all are tested. If the machine finds a fault, the progression stops, and an alarm is sounded.

The machine makes current capacity tests, insulation tests, indicates sequence of conductors and shows short circuits or grounds. It is suitable for 27-, 21- and 16-pole locomotive jumpers or any combination of these and also for train control and electric brake jumpers.

During tests, the cables are bent back and forth by two oscillating arms which are secured to the cable by ratchet clamps about 12 in. apart, near the center of the cable. The arms are driven by two cranks 180 deg. apart to produce a 4½-in. stroke, at 36 oscillations per minute. A motor and gear box drive the cranks.

The machine operates from a 120-volt, a-c power source and 800 volts for the insulation test is obtained from a step-up transformer while 24 volts for the current test is supplied by a current transformer.

For the continuity and current-carrying test, the lever at the lower left of the control panel, is set on 24 volts, and the timer just above and to the right of the first lever, is set at 15 seconds. The current, by means of the rheostat at the right is set at 50 amp. The machine is then started and at the end of the 15-second period, the dropping out of the timer relay energizes a coil which pushes a ratchet, advancing the switch to the next pole. As it moves from one pole toward the next, the circuit breaker drops out and when it contacts the next pole, the circuit breaker closes. If all circuits are in good condition, this operation continues until all circuits are tested.

In case of an open circuit, a relay opens the circuit breaker which stops the timer and sounds a buzzer until the operator resets the machine. The timer is motor-driven and the timer setting on the panel controls the motor speed. On this, test current flows from the source to the circuit breaker, to the dial switch, to a jumper pole and from the other end of the jumper pole back to the source.

For the high-potential test, 800 volts is applied in sequence to the terminals. If a short occurs, the circuit breaker kicks out and the buzzer sounds. The reset button must then be used to restart the sequence. Progression may be made manually if desired.

The tester was designed and built by Sam Brice, Electrician, G. N. Shops, Hillyard, Washington.

From the Diesel Maintainer's Note Book

The Fire That Wouldn't Go Out

By Gordon Taylor

■ A GP-7 unit was dispatched for service on a work train with everything apparently working okay. Along the line a fire in a field had spread to weeds on the right-of-way. As the work train passed this area, the fire was so close that it ignited oil on the side and bottom of the fuel tank. The crew immediately stopped the train and used the fire extinguishers on the locomotive, but were unable to extinguish the fire.

It then became necessary to run the locomotive to a small town about a mile away, where the flame was extinguished by the local fire department. There seemed to be no damage, but some scorched paint on the fuel tank.

Such fires usually can be extinguished by the extinguishers on the locomotive, but in this case there seemed to be some unexplainable reason why the flame would not go out. The unit had been thoroughly cleaned up and it was supposed that all of the grease on and around the fuel tank had been washed away before the unit was dispatched for service.

For several days no one could explain why the fuel tank had become oily and why the fire persisted in burning after attempts had been made to extinguish it. Several possible reasons were given as explanations, but none of them seemed to be reasonable.

Finally, it was discovered that a ⅜-in. copper tube line, which is known as the fuel vent and return line, connected with the fuel level gage on the side of the locomotive, was broken in such a manner that a small quantity of fuel was leaking out in this line down on top of the fuel tank.

When there is a fuel oil tank on a diesel locomotive that persists in remaining covered with oil, it is necessary to examine the fuel line referred to. This location is very difficult to get to in making repairs, and it is usually necessary to drop one of the air reservoirs from the locomotive to enable the pipefitter to reach over the end of the fuel tank to make the necessary repairs. Where possible, this fuel line should be braced or supported in some manner to eliminate vibration.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

A Step Nearer an Atomic Locomotive

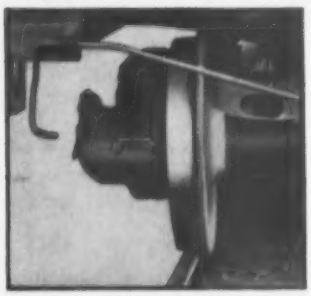
■ Two General Electric engineers have proposed an atomic reactor design which promises to remove many obstacles to the use of atomic power plants in airplanes, locomotives and ships.

The design more than halves the weight per horsepower of conventional atomic reactors and eliminates many moving parts that are standard in such equipment. It is a liquid sodium reactor, and most of the weight and bulk of the conventional reactor is eliminated by nesting the reactor inside a cylindrical heat exchanger.

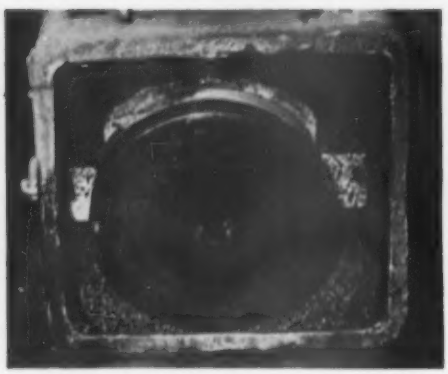
This arrangement eliminates the separate heat exchanger used to convert water into steam to drive turbine-generators. It also eliminates much piping, valves and open space which must be shielded to protect personnel from radiation.

The space saving and simplification of the reactor are achieved in the G-E design through use of electrical energy generated by temperature differences in the heat exchanger. It is comtemplated that this source of power can be used directly to pump the liquid metal coolant.

Here's how Magnus improve freight



100 50'-6" Frisco box cars like the above are equipped with R-S Journal Stops. Inset shows end view of truck and hex-head bolts that secure the stops. Frisco box cars, series 7000 to 7099, were equipped with R-S Journal Stops as a result of extensive tests on 9 additional cars that established improved performance and maintenance savings.



Journal box with R-S Journal Stops after flat switching impact at 11½ mph. Packing is still in proper position. Compare with photos at right.

This CAN'T HAPPEN when you use R-S Journal Stops

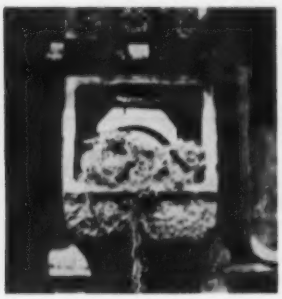
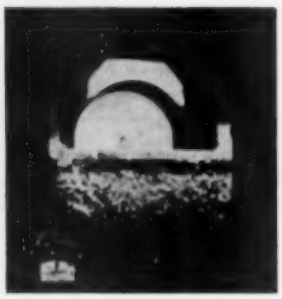


Photo of journal box at impact of 6 mph, showing how bearing is cocked off journal and packing is displaced.



When air and hand brakes are both applied, bearing and entire box are raised, compressing packing.

MAGNUS METAL CORPORATION

R-S JOURNAL STOPS
car performance

Three years service on the Frisco proves that this new development greatly reduces hot boxes, improves journal bearing lubrication, and cuts truck maintenance costs all along the line.

WITH MAGNUS R-S Journal Stops you can virtually eliminate hot boxes due to waste grabs. The bulk waste is always held firmly in position, and the bearing just can't be unseated to trap lint or short strands beneath the bearing crown. Because there's no packing displacement, oilers can service cars faster, too.

And because you hold the journal in its proper position, spread linings are prevented — and you get far longer bearing life. On the Frisco's first test car, *in 38 months there hasn't been a bearing replacement* — much less a hot box!

Improved Bearing Lubrication

R-S Journal Stops will make for constant bearing lubrication, too. Impacts or braking can't force the journal out of position — can't force the box to rise and compress packing. Without journal stops, whenever you have impacts or heavy brake applications, not only is the packing knocked out of position, it's squeezed against the underside of the journal. Then there's a definite loss in packing-to-journal pressures, a definite loss in lubricating ability of the packing.

But with journal stops, you avoid all that. Within given limits you maintain constant journal-packing pressures, and you supply a constant feed of oil to the bearing.

Many Other Maintenance Savings

To date all indications point to reduced and more uniform wheel flange wear when cars are equipped with R-S Journal Stops. But that's not all. You eliminate crushed dust guards and false brake piston travel. The prospects are for reduced center pin wear and a lower mortality rate for coil springs. That's why R-S Journal Stops can be used to real advantage with pad or mechanical lubricators or packing "containers." In fact, regardless of the lubricating method, R-S Journal Stops cut maintenance costs all along the line.

Easy Installation

You can apply R-S Journal Stops to any standard freight car journal box — either separable or integral-cast type. Installation is simply a matter of drilling two holes in each side of the box, inserting and bolting stops and shimming to proper journal clearance. Bearing and wedge can be taken out for inspection without removing the stops. To change side frames, you just remove one stop from each box.

Write us today for complete information. Magnus Metal Corporation, 111 Broadway, New York 6, N. Y. or 80 E. Jackson Blvd., Chicago 4.

MAGNUS
Solid Bearings

Subsidiary of **NATIONAL LEAD COMPANY**

New G-E axle-driven generators give the extra power, reliability for long, trouble-free

General Electric's new GMG-162 axle-driven motor generator has over twenty-five percent more reserve power than competitive equipment. Here's what that means:

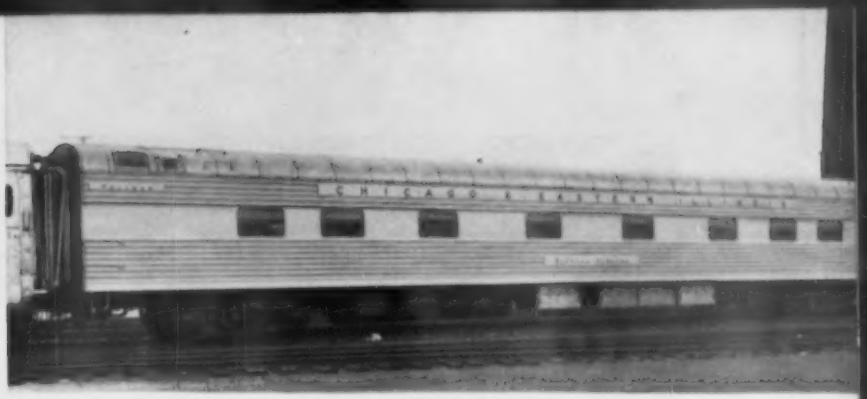
1. Better battery record. There is enough power available to charge low batteries while the car is in operation. Therefore, fewer standby rechargings are required.

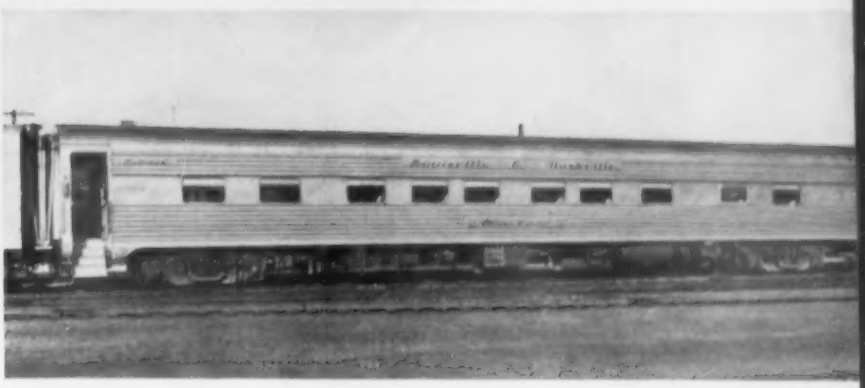
2. Should axle generators in other cars become inoperative, increased demand can be met effectively. In a recent test simulating emergency conditions, load requirements of four modern air-conditioned passenger cars were supported by *one* GMG-162.

In addition, General Electric's GMG-162 has a highly simplified control system, uses only two control panels, eliminates armature reversing switch and reduces number of moving parts. It is easy to install and to maintain. For more information contact your G-E Apparatus Sales representative. General Electric Company, Locomotive and Car Equipment Department, Erie, Pa. 115-5A

Progress Is Our Most Important Product

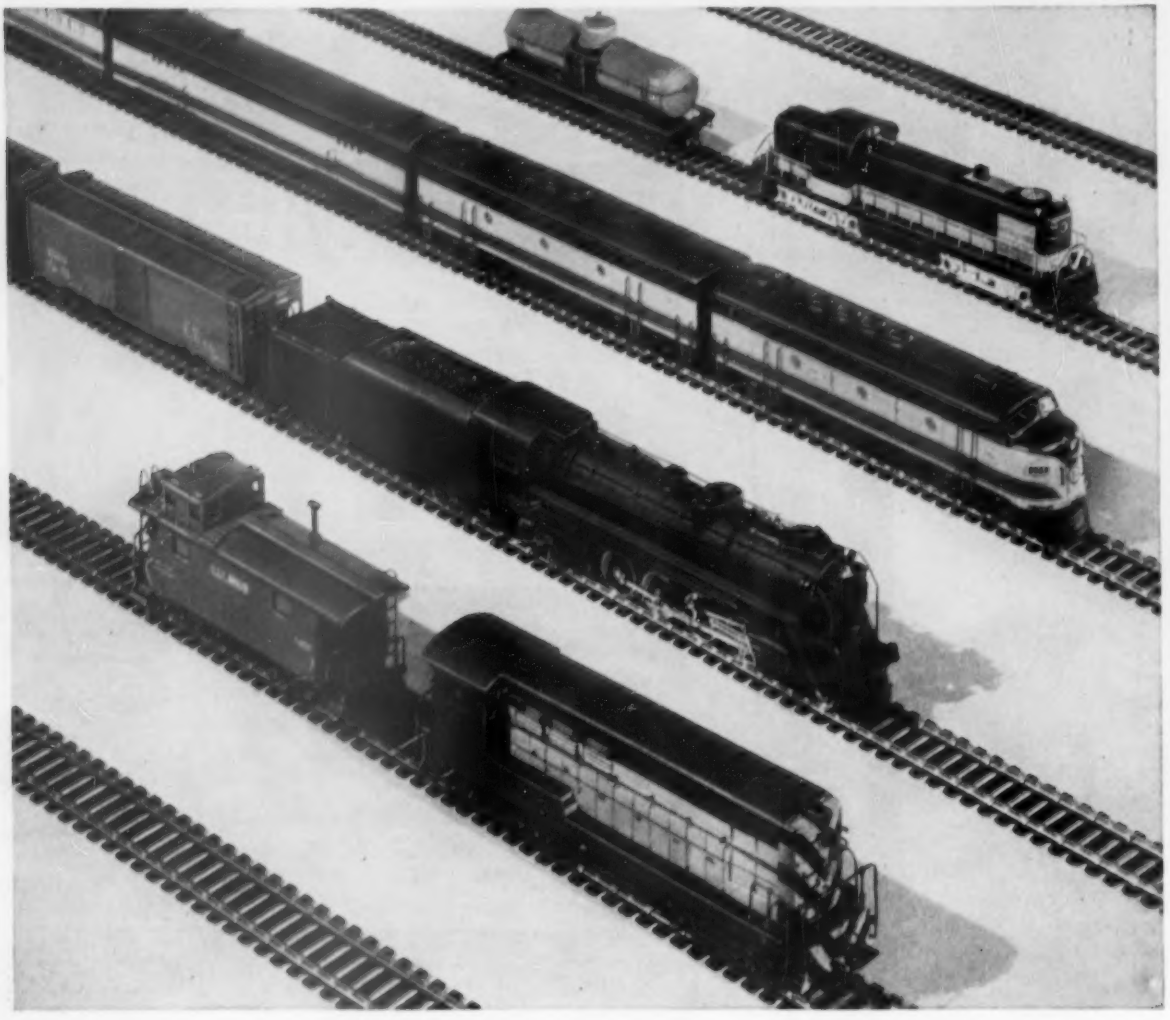
GENERAL ELECTRIC





"Dixieland" operation

The first cars equipped with G.E.'s new GMG-162 were delivered to the Canadian National and Rock Island railroads in 1954. In the short time since then, orders have been received from: Atlantic Coast Line, Nashville, Chattanooga and St. Louis, Chicago and Eastern Illinois, Florida East Coast, Louisville and Nashville.



THE ONLY SYSTEM THAT CLEANS THEM ALL

There has long been a need in the railroad industry for an effective method of cleaning the exterior surfaces of diesel and steam locomotives, passenger coaches, and other rolling stock, regardless of contour—and yet, one which would do the job at minimum expense of labor, time, and materials. The Dearborn Pressure Cleaning System is the carefully planned answer to that demand.

It is a combined equipment-material system which incorporates a series of spray standards with water under pressure to clean all surfaces of the unit from trucks to roof. After preliminary wetting of the surface, a Dearborn acid detergent is applied by spray. This is followed shortly by a similar application of a Dearborn alkaline detergent. Next, a spray of water under extremely high pressure rinses away the dirt and soil film previously loosened by the detergents. This spray method of cleaning reaches all the "hard-to-get-at" nooks and crannies on switchers, tank cars, cabooses, and other units of irregular contour—and cleans them thoroughly.

In addition, Dearborn has recently perfected a process for spray-cleaning coaches that *eliminates streaking on exterior surfaces and windows.*

Because of its performance efficiency and its lower cleaning cost per unit, the Dearborn Pressure Cleaning System is fast becoming standard with America's leading railroads. Write for information.

Dearborn PRESSURE CLEANING SYSTEMS

DEARBORN CHEMICAL COMPANY, Merchandise Mart Plaza, Chicago 54, Ill.

ASSOCIATION
OF AMERICAN
RAILROADS

Rx

Prescription

Must be of material to specification

Must be cast and fitted to close tolerances

Must have complete interchangeability of all parts

Must be sold at a reasonable price

NATIONAL
MALLEABLE AND STEEL
CASTINGS COMPANY
CLEVELAND 6, OHIO

A standard coupler was needed

Small freight cars or large, small locomotives or mighty, all would be useless without some way to join them together; thus, we find the history of the present day automatic coupler most interesting. Many years have passed since the link and pin, the Miller Hook and the first coupler of Eli Janney.

So frightful were the accidents of coupling and uncoupling with the old link and pin method that in 1893 Congress passed the Safety Appliance Act, which made it mandatory that after January 1, 1898, all cars used in interstate commerce must be equipped with couplers which would couple automatically on impact, and uncouple without a man stepping between the cars.

While the federal statute saved countless limbs and lives, yet it posed for the railroads a tremendous problem, in that soon there were over 100 different types of couplers, knuckles, locks, and parts.

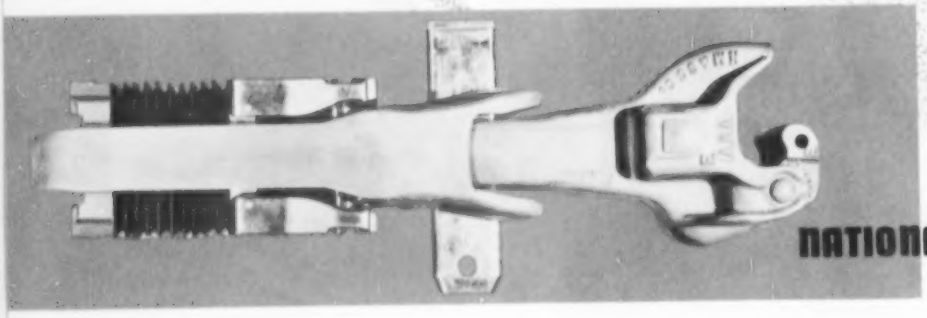
Finally, in 1916, the Type "D" Coupler was adopted as standard for railroads of the United States, Canada and Mexico. With the adoption of a standard coupler it soon became evident that a set of specifications would be necessary to control material, tolerances and so forth. In 1918, the Association of American Railroads set up the first specifications on the manufacture and inspection of couplers.

A comprehensive inspection and gauging program, to assure the railroads the highest quality couplers, is conducted by the coupler manufacturers in accordance with the A.A.R. specifications. Also, the coupler manufacturers periodically engage jointly in an extensive program consisting of complete inspection, gauging, interchange and testing of "E", "F" and "H" couplers.

These A.A.R. specifications, revised and expanded from time to time, require a total of 133 gauges for the three couplers — "E", "F" and "H" — covering 563 gauging points.

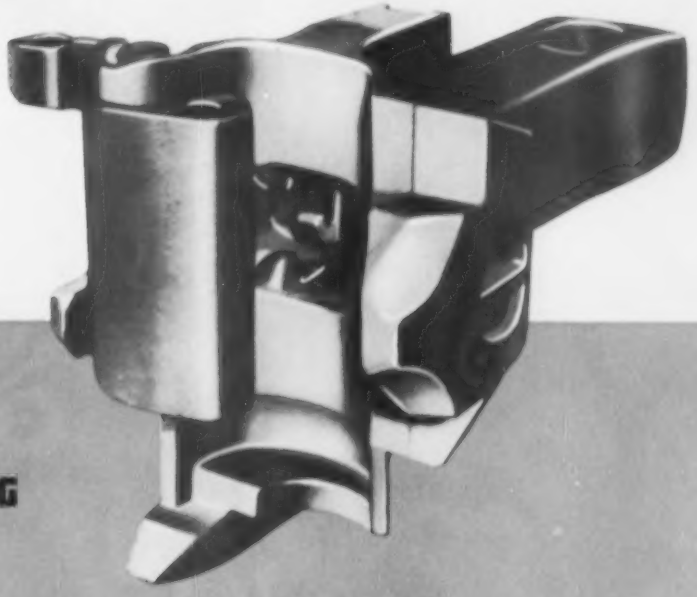
In addition to the A.A.R. coupler specifications, some railroads even go further and require magnafluxing of all couplers ordered by them.

National is proud to have played, and to continue to play, an important part in the development of modern railroad couplers, and will continue to more than follow the inspection and gauging specifications set down by the Association of American Railroads.



NATIONAL DRAW GEAR ASSEMBLY

50 GAUGES
214 GAUGING POINTS

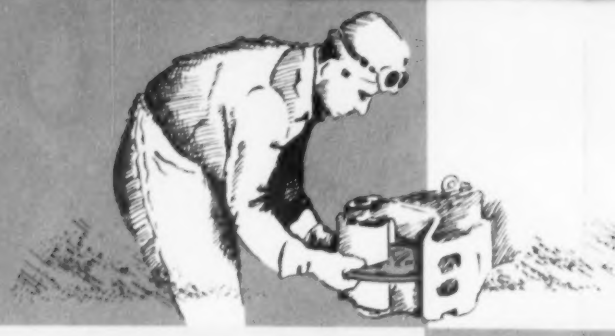


TYPE "F" INTERLOCKING COUPLER

The Type "F" coupler was developed, at the request of the railroads, for freight service after the proven ability of the highly successful Type "H" tightlock coupler in passenger service. Stronger than the Type "E", with interlocking wings for alignment, the Type "F" is proving its many advantages in service today.

None of the parts are machined, but with close tolerance control the free slack between knuckles has been reduced to about 50 per cent of that in the "E". Another safety factor is the centrally located shelf on the lower front face which serves to support a conventional type coupler in event of a pull-out.

STANDARD "E" COUPLER



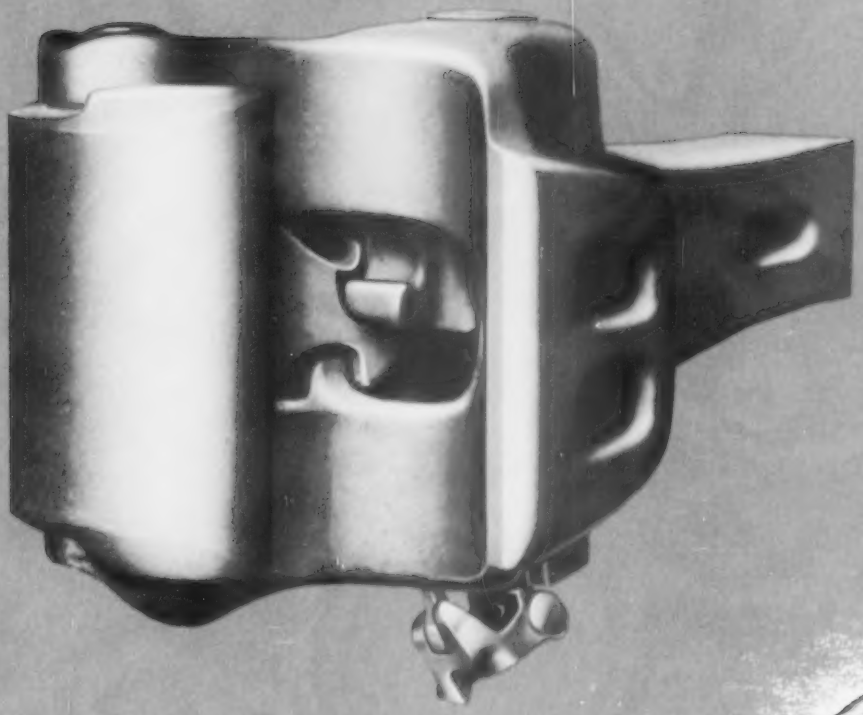
47
GAUG

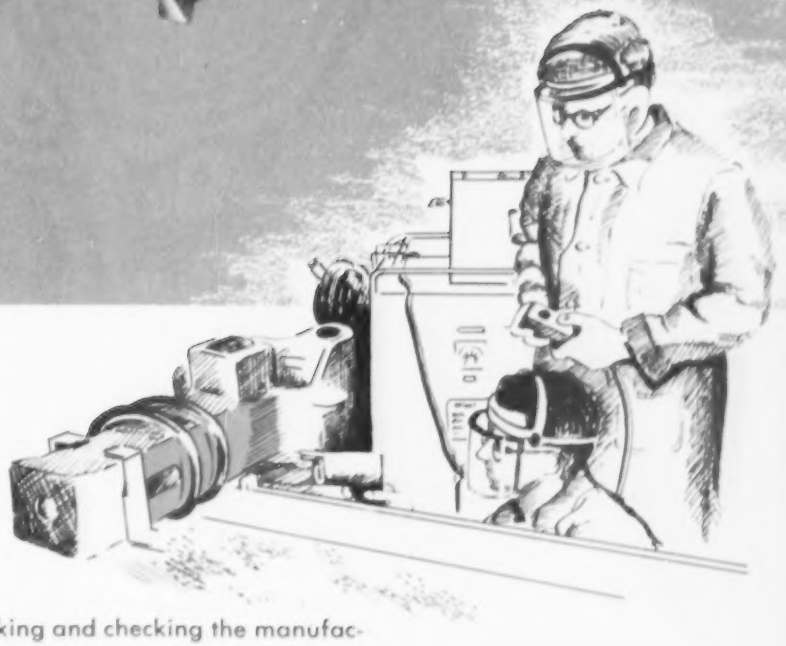
18
GAUG
POIN

Illustrated above are the 47 gauges used on the "E" coupler. Shown on this page are two of the numerous gauging operations which all National "E" couplers must pass before shipment to railroads. On the next page the magnafluxing operation is illustrated.

47
AUGES

182
AUGING
OINTS



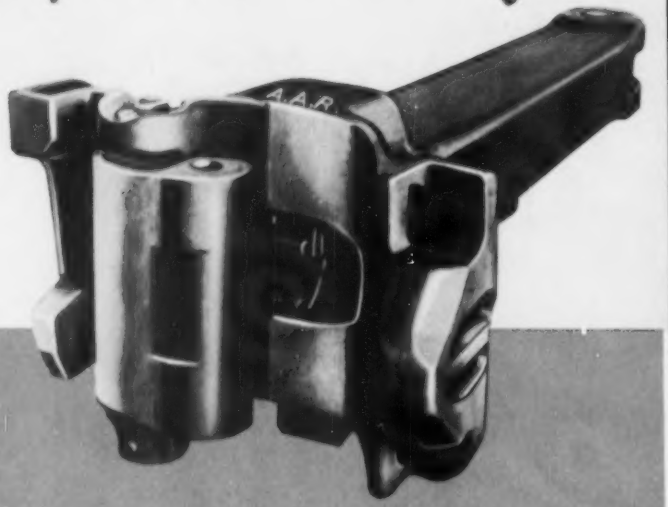


The A.A.R. Standard Type E-60 coupler, proud successor to the Type "D" coupler, became standard in 1932. It is made of Grade B Steel with high tensile steel knuckle and lock. A set of manufacturing gauges for this type of coupler costs approximately $14,000. with several sets required for quantity production (A set of master gauges required for making and checking the manufacturing gauges costs $12,000.). This type of coupler is also produced in high tensile steel.

The high tensile steel knuckle is purposely designed to be somewhat weaker than the body of the coupler or attachments. In other words, it is the "safety valve" used to protect the more expensive and less readily replaceable parts of the draft system.

NATIONAL
MALLEABLE AND STEEL
CASTINGS COMPANY
CLEVELAND 6, OHIO

TYPE "H" TIGHTLOCK COUPLER



36 GAUGES

167 GAUGING POINTS

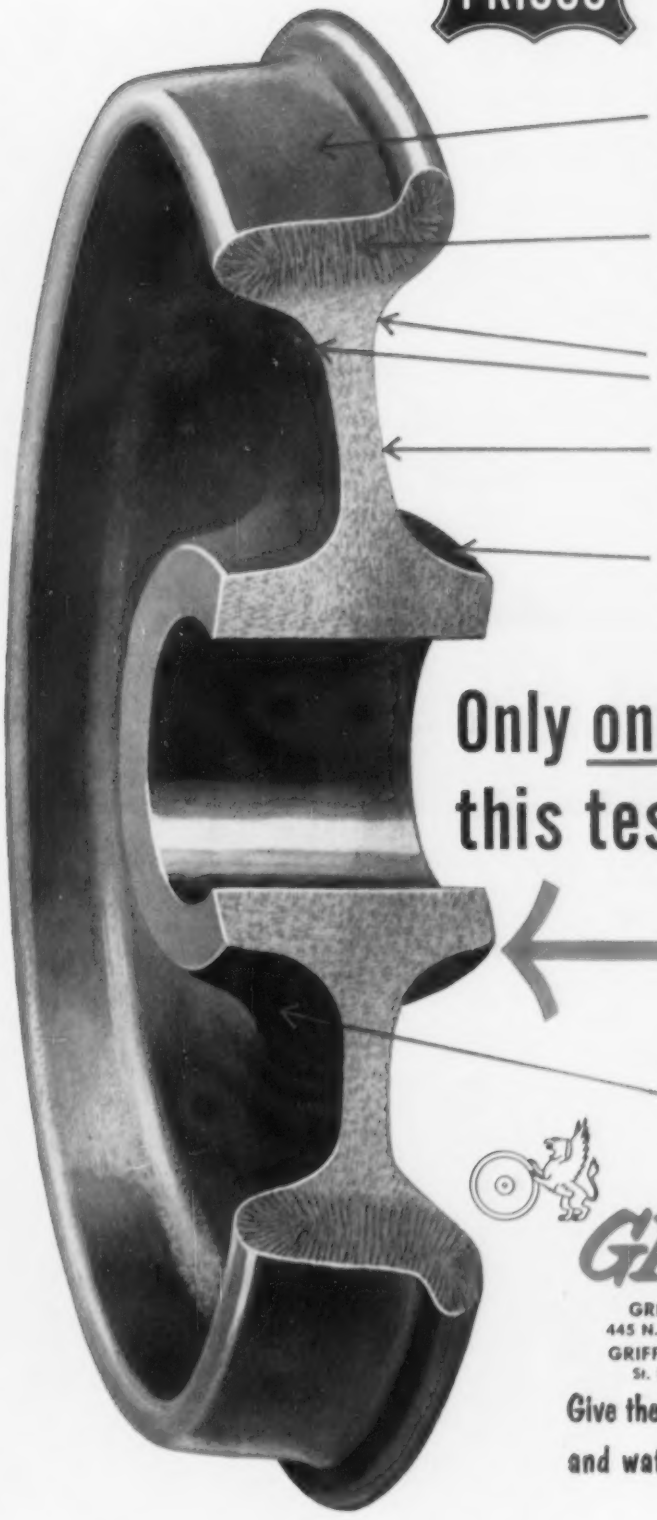
10 MACHINING OPERATIONS TO CLOSE TOLERANCES

Introduced to the railroads in 1936, the Tightlock coupler for passenger car service quickly proved itself to be one of the greatest safety factors ever used by the railroads. In addition, the elimination of free slack between the knuckles made for greater passenger comfort than was heretofore possible.

National is proud to have been the largest contributor to the development of this coupler.

FRISCO

The Frisco is one of the progressive railroads now testing the Griffin EQS.



Roundness of EQS wheel is practically perfect—as-cast. No machining necessary . . . the toughest and longest-wearing metal is *on the tread, NOT in the scrap bin.*

Pressure pouring in graphite molds results in superior flange and tread wear. Note the directional solidification in flange and tread, shown before heat treatment: *the grain of the metal in EQS wheels is at right angles to the point of wear.*

Long sweeping fillets under flange and rim of EQS wheels insure greatest possible strength.

The Griffin EQS plate is of *uniform thickness*, dimensionally accurate in any section.

Now made of .75 carbon steel. Exclusive casting process used in producing EQS wheels permits use of recognized steel analysis that will best meet your requirements.

Only one wheel can pass this test with a score of

100

Location of hub and plate is identical in all EQS wheels; dissipation of heat is even, without developing internal stress.

GRIFFIN EQS
ELECTRIC QUALITY STEEL

GRIFFIN WHEEL COMPANY
445 N. Sacramento Blvd., Chicago 12
GRIFFIN STEEL FOUNDRIES LTD.
St. Hyacinthe, Quebec, Canada

Give the "green" to GRIFFIN... and watch your costs go down!

The Ram Makes

I The big square-lock ram on BETTS Car and Diesel Wheel Borers has superior resistance to torsional loads. more effective bearing area, less wear and better aligning characteristics.

II The basic ram aligning surfaces of the machine are protected against wear by renewable liners.

III The hydraulic feeding pressure is applied to the ram *on the axis* of the wheel bore.

This square-lock ram design is one of many reasons why BETTS Car and Diesel Wheel Borers will give you better wheels.

CONSOLIDATED MACHINE TOOL

A Division of Farrel-

the Difference!

BETTS
DIESEL WHEEL BORER

L COMPANY, ROCHESTER 10, N. Y.

el- Birmingham Company, Incorporated

Questions and Answers

General Motors

Diesel-Electric Locomotives

This is a new series of Questions and Answers pertaining to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

Fuel Flow *(continued)*

G224-Q—What would show a normal situation?
A—Normally, a small amount of fuel will leak by the plunger and come out the small hole in the stand pipe of the by-pass sight glass.

G225-Q—What would indicate abnormal leakage?
A—When the leakage is sufficient that the fuel flows out of the top of the sand pipe. This fact should be reported to the maintenance force.

G226-Q—What check should be made if no fuel is flowing through the fuel return sight glass?
A—In this event, check fuel pump motors and fuel pumps.

G227-Q—Suppose that pumps in all units are stopped?
A—In this case, check PC switch and fuel pump fuse in distribution panel.

G228-Q—When making this check what precaution must be observed?
A—Do not confuse fuel pump fuse and fuel pump motor fuse.

G229-Q—What should be checked in case of a fuel failure, if pumps on other are running?
A—Check switch on engine control panel and control switch, 80 ampere and fuel pump motor fuse in the distribution panel of the unit affected.

G230-Q—Suppose that fuel pump is running but no fuel is being pumped?
A—In that case, check fuel supply, emergency fuel cut-off under the unit, or check for a suction leak in piping between tank and pump, also check for broken or slipping coupling at the fuel pump.

Engine Speed and Fuel Indicators

G231-Q—How many pointers are on the cover of the governor?
A—Two.

G232-Q—What does one of these pointers indicate and how is it labeled?
A—One of these two pointers indicates the throttle position of the engine and is labeled SPEED.

G233-Q—What does the other pointer indicate?
A—The second pointer indicates the position of the power piston in 16ths of an inch and is labeled FUEL.

G234-Q—How is the fuel scale interpreted?
A—The lower the number on the fuel scale, the greater the quantity of fuel which is being injected into the cylinder.

G235-Q—How should the fuel indicator pointer read in No. 8 throttle (speed) position?
A—The pointer should indicate between 5 and 6 if the engine is properly loaded.

Filling Fuel Tanks

G236-Q—Can the fuel tanks be filled from either side of locomotive?
A—Yes.

G237-Q—What is there to indicate the level of fuel oil?
A—Direct reading sight level gauges located on each side of the fuel tank adjoining the fuel fillers, indicating the level of fuel oil starting at 4½ inches from the top of the tank, and should be observed while filling the tank to prevent overflowing.

G238-Q—What should be done with the fuel oil before it enters the tank?
A—It should be filtered through a reliable fuel filter before it enters the tank.

G239-Q—What precaution must always be observed when handling fuel oil?
A—Never handle fuel oil near an open flame.

Fuel Gauge

G240-Q—Describe the fuel gauge.
A—This is a direct reading, air operated gauge, located on the engine control and instrument panel, which indicates the quantity of fuel in the fuel tank.

G241-Q—Does the gauge show fuel level continuously?
A—No. A push button needle valve directly below the fuel gauge, must be pushed in to get the fuel level indication on the gauge.

Emergency Fuel Cut-Off Valve

G242-Q—What is the function of the Emergency Fuel Cut-Off Valve?
A—To cut off the fuel supply to the fuel pump in the event of fire or any other emergency.

(Manual 2310, page 408)

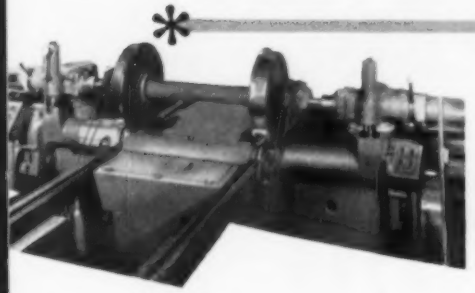
G243-Q—Where is it located?
A—It is located in the center of the underside of the fuel tank inside a valve compartment on which is a sliding cover.

G244-Q—Describe the arrangement further.
A—On each side of the locomotive, both A and B units, attached to the side skirt, is a small box with a lift cover. Enclosed in this box is a pull ring on the end of the cable running to the fuel cut-off valve.

G245-Q—Where are similar pull rings located?
A—A similar ring is located in the operating cab of each A unit, and one on the engine room wall at the governor end of the engine in each B unit.

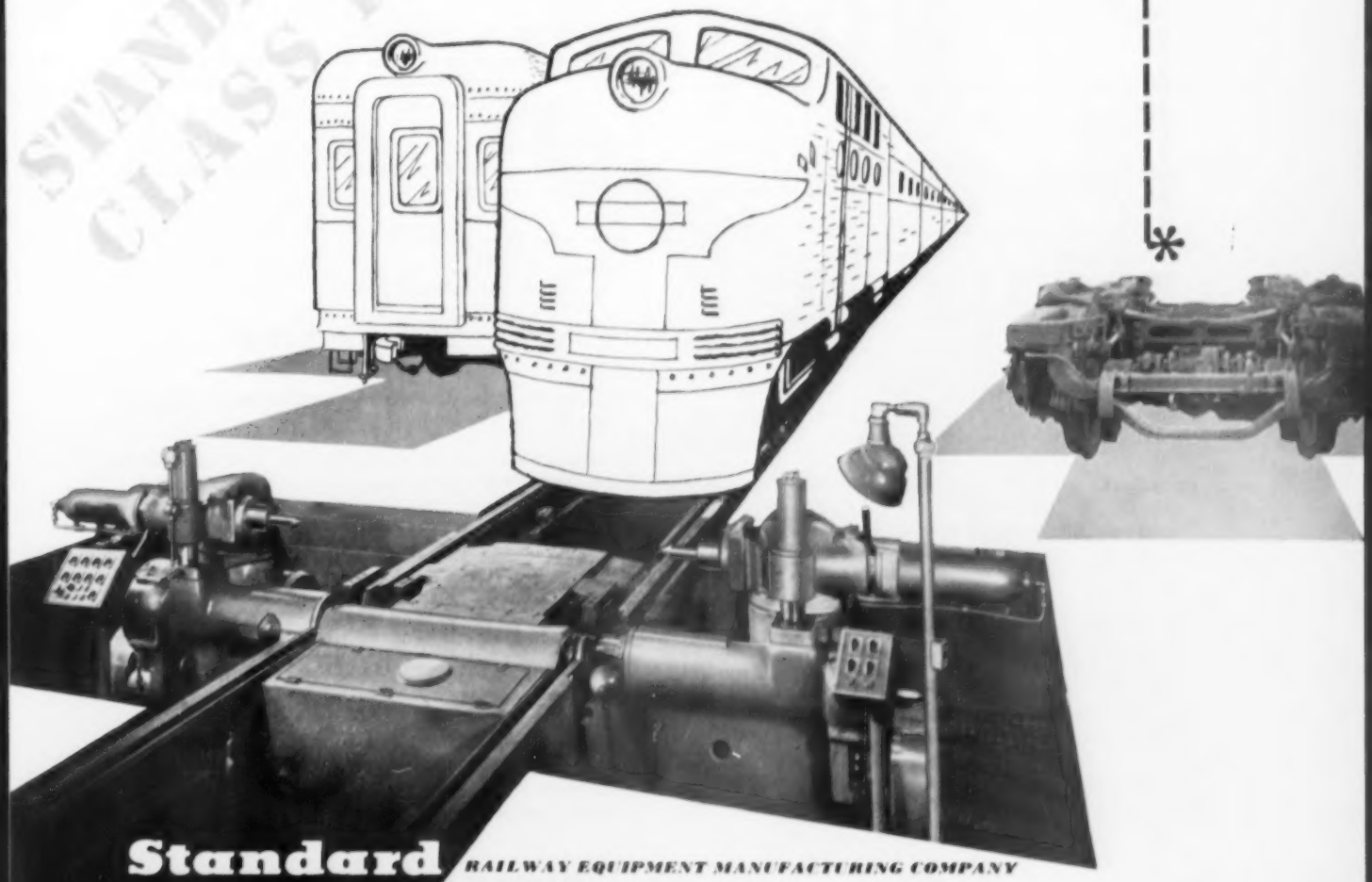
G246-Q—What is the purpose of the pull rings?

the Standard WHEEL TRUING MACHINE for ALL WHEEL WORK



From a locomotive to a pair of mounted wheels, the **Standard** Wheel Truing Machine is equipped to handle *all* truing jobs.

One man operation by push button controls. The **Standard** Wheel Truing Machine eliminates the costly delay of dropping trucks and removing wheel and axle assemblies for turning of wheels. The **Standard** Wheel Truing Machine is the most efficient method for restoring wheels to contour for cars or locomotives, whether on *or off* the equipment.



STANDARD ON LEADING CLASS I RAILROADS

Standard *RAILWAY EQUIPMENT MANUFACTURING COMPANY*

GENERAL OFFICE: 4527 Columbia Avenue, Hammond, Indiana

New York • Chicago • St. Paul • San Francisco

Standard *Railway Equipment Manufacturing Co., (Canada) Ltd.*

Sun Life Building, Montreal

A—The fuel cut-off valve can be tripped and the fuel then cut off by pulling any one of these rings.

G247-Q—If tripped, do the valves reset automatically?
A—No, if tripped the valve underneath the fuel tank must be reset manually.

G248-Q—How is the valve reset?
A—To reset: Crawl under locomotive fuel tank and slide valve compartment to one side. Pull valve stem out and set yoke in place to hold valve open. Close compartment cover.

Electrical Equipment

(Manual 2310, page 300)

General Electrical Scheme

G249-Q—What is the relation of the engine to the main generator?
A—In full throttle, the rated horsepower of the engine is delivered to the direct coupled generator.

G250-Q—What takes place at the main generator?
A—At the main generator the power of the engine is transformed into electrical power.

G251-Q—How is this power then utilized?
A—The electrical power is then conducted to the four traction motors, two motors being located in each truck.

G252-Q—How is the power as conducted to the motors used?
A—Each motor is geared to a locomotive axle.

G253-Q—Does the power (KW) delivered to the traction motors at full throttle vary according to the engine speed?
A—The locomotive is designed so that the current and voltage limits of the main generator, that the power delivered to the traction motors at full throttle is the same, regardless of the locomotive speed.

G254-Q—How can the electrical system of the locomotive be thought of as being divided?
A—Into three separate systems: 1 High voltage (includes dynamic braking if used; 2 Low voltage system; 3 Alternating current system.

G255-Q—In what way is the high voltage system concerned?
A—The high voltage system is directly concerned with moving the locomotive; or in retarding the locomotive in case dynamic brakes are supplied and are in use.

G256-Q—What are the main components of the high voltage system?
A—Main generator, traction motors, forward and backward transition relays, shunt field contactor, motor shunting contactors, reverse drum, wheel slip relays, ground relay and parallel power contactors.

G257-Q—On locomotives equipped with dynamic brakes, what else may be considered to be in the high voltage system?
A—The cam switch, braking contactors and brake grids.

G258-Q—In what way is the low voltage system related to the electrical system?

(Manual 2310, page 302)

A—The low voltage system contains the control circuits which control the flow of power in the high voltage system, and those auxiliary circuits conducting power to the locomotive lights, heater fans, fuel pump and the main generator battery field.

Fairbanks-Morse
Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

Summary of Correct Governor-Load Regulator Settings

Load Regulator Timing

F208-Q—What should be the timing with warm oil?
A—Five seconds, minimum to maximum; ten seconds, maximum to minimum.

F209-Q—What should the timing be with cold oil?
A—Seven seconds, minimum to maximum; 15 seconds, maximum to minimum.

Governor Power Piston Gap

F210-Q—What should the gap be at full load?
A—The gap should be $\frac{3}{8}$ inch.

F211-Q—What should the gap be at IDLE?
A—The gap at IDLE should be $\frac{60}{64}$ inch.

F212-Q—What are the corresponding fuel pump readings?
A—8CS, 8OCs, 16 total.

F213-Q—What would be the position of the load regulator at Locomotive start?
A—In minimum field, i.e. load regulator in minimum field with throttle in IDLE.

Fuel Oil System

(Bulletin 1706—116-A, page 1-2)

F214-Q—Referring to illustration 1 (page 2), where does the fuel originate?
A—The 1,200 gallon fuel supply tank underneath the locomotive.

F215-Q—Where does the fuel oil go, from the tank?
A—The fuel transfer pump draws fuel from the tank through an emergency fuel cut-off valve and through a fuel suction strainer.

You'll cut handling costs with ROEBLING ALL-PURPOSE SLINGS

You can have these slings with a tapered sleeve attachment with a heavy steel galvanized thimble plus the following attached fittings:

Drop Forged Steel Weldless Hook

Drop Forged Weldless Shackle

Weldless Link

THESE are the easiest-to-handle slings ever put on the market. There are no servings—no bulky sections of rope next to the loop. All wire ends are safely and permanently covered by the tapered sleeve. And on top of that, these slings are remarkably flexible, *doubly* safe, and real time-savers on the big majority of lifting jobs.

Roebling All-Purpose Slings come to you ready for work. They cost less than most other slings and they're a cinch to order. They have the full catalog strength of the "Blue Center" steel wire rope with I.W.R.C. from which they're made, assuring maximum sling service life.

Roebling All-Purpose Slings are stocked in standard sizes and lengths for immediate delivery. Order them from your jobber—and write us for descriptive folder. John A. Roebling's Sons Corporation, Trenton 2, N. J.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13325 LAKEWOOD HGTS. BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5240 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, NEW JERSEY

Questions and Answers

F216-Q—Where does the fuel oil flow to after passing through the fuel transfer pump?
A—Through a pressure relief valve in the transfer pump discharge line and through a fuel pressure filter to the engine fuel headers.

F217-Q—What is the function of the pressure relief valve?
A—To by-pass fuel back to the tank in the event of a clogged pressure filter. The relief valve is set for approximately 40 pounds.

F218-Q—What is used to indicate pressure supplied to engine fuel header?
A—A fuel pressure gage, mounted at engine control panel.

F219-Q—What do the fuel headers supply?
A—The engine fuel pumps and nozzles. There is a relief valve at header outlet.

F220-Q—What is the purpose of the fuel return headers?
A—To pass excess clean fuel back to fuel tank.

F221-Q—How is the fuel tank filled and what precautions should be taken?
A—Filling is from either side of locomotive at a rate of 250 gallons per minute. Fuel should be filtered before it enters the tank and should not be handled near an open flame.

(Bulletin 1706—116-A, page 3)

F222-Q—How is the fuel tank drainage provided for?
A—There are two drain plugs at either end for draining the tank and a plug at the bottom of the sump for draining any water. Both tanks should be drained periodically for water and sediment.

F223-Q—What should be done during freezing weather?
A—It is advisable to put about five gallons of alcohol in the fuel tank during freezing weather, to settle in the sump and prevent water from freezing. Under severe conditions more alcohol may be added for the tank itself.

F224-Q—Describe the tank vents.
A—There are two vents, one on each side, terminating above the tank, equipped with four in. flame arrestors.

F225-Q—What is the purpose of the auxiliary line tapped into the main suction line, between the emergency cut off valve and the fuel pump?
A—This is the supply line to the steam generator (on passenger units).

F226-Q—What is the reason for having a relief valve at the header inlet?
A—More fuel is pumped through the injection system than is needed, and the relief valve maintains a pressure of 15 lbs at the header outlet.

F227-Q—What becomes of the excess lubricating oil from the injection push rod lubrication, also fuel oil leaking from the injection tube connections?
A—As it collects in the injection nozzle compartment, it is piped to a drain to the ground at the right corner of the fuel tank.

F228-Q—What is a must, in regard to fuel supplied?
A—Fuel must be clean to avoid trouble in the system.

F229-Q—What should be the fuel pressure at full engine speed?
A—Approximately 20 to 25 pounds.

F230-Q—What may be the cause, if the pump runs and this pressure does not show?
A—The cause may be no fuel in tank, emergency cut off valve tripped, leaks in fuel suction line, clogged suction strainer, worn pump packing rings, pump relief valve sticking or clogged pressure filter.

F231-Q—What takes place if a tube between the injection pump and nozzle should break or loosen?
A—The escaping fuel will be carried away in the waste fuel drain.

F232-Q—What must be done if this happens?
A—The pump having the defective tube should be cut out (as shown in illustration 3, page 5, section 116-A).

F233-Q—Describe this operation.
A—Pull out the control rod plunger and at the same time push the control rack assembly as far as possible to the right so that the plunger end no longer engages in the slotted end of the rack. The pin can be released and the pump will no longer deliver fuel.

F234-Q—What should be the limit as to the number of pumps cut out at one time?
A—Four pumps on a 10 or 12 cylinder engine. Two pumps on an 8 cylinder engine and then only long enough to get to a maintenance point.

(Bulletin 1706—116-A, page 6)

F235-Q—How may an irregular operation be detected?
A—A cylinder not receiving fuel or not firing can be detected by the irregular sound of the engine. Likewise, any cylinder getting excessive fuel due to defective nozzle can be detected. Any pump not functioning properly should be cut out.

Lubricating Oil System

(Bulletin 1706—117-A, page 1)

F236-Q—How does the lubricating oil system function?
A—The lubricating oil system serves a dual purpose by furnishing oil to the engine for cooling the pistons and lubricating the various bearings and wearing parts under pump pressure.

F237-Q—Describe the flow of lubricating oil.
A—The engine driven lubricating oil pump draws oil from the engine crank case through a coarse strainer, and pumps it through a 6 element filter to the oil cooler. Here, the oil is circulated around water cooled tubes and then piped through a strainer to the engine oil headers. Flow continues through the engine parts and back to the crank case.

F238-Q—How does the oil flow at idling speed?
A—The design is such that at idling speed all oil flows through the 6 element filter.

The famous *General* became a prize of war during the Civil War when she was captured at Big Shanty, Ga. However, after a hair-raising 90-mile chase, she was recaptured by two intrepid railroad men with the assistance of Confederates. She remained in special service well into the 1890's.

Then...and now... serviced with Esso Railroad Products

Valuable years of experience in research and development, along with continual testing on the road and in the lab, stand back of the outstanding performance of famous Esso Railroad Products.

Diesel Fuels
ESSO ANDOK Lubricants—versatile greases
ARACAR—journal box oils
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ESSO XP Compound—hypoid gear lubricant
DIOL RD—Diesel lube oil
COBLAX—traction motor gear lube
VARSOL—Stoddard Solvent
SOLVESSO—Aromatic solvent
ESSO Weed Killer
ESSO Hotbox Compound
AROX—pneumatic tool lube
CYLESSO—valve oil
ESSO Journal box compound
Asphalt
Cutting Oils
Rail Joint Compounds
Maintenance of Way Products
Signal Department Products
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ESSO STANDARD OIL COMPANY — Boston, Mass. — Pelham, N. Y. — Elizabeth, N. J. — Bala-Cynwyd, Pa. — Baltimore, Md. — Richmond, Va. — Charlotte, N. C. — Columbia, S. C. — Memphis, Tenn. — New Orleans, La.

Supply Trade Notes

(*Continued from page 12*)

land. The laboratories will engage in basic, exploratory work, mainly on solid state physics research in the broad abstract sense as well as the practical investigation and design of materials to meet future requirements of industry. *Dr. Robert G. Breckenridge* will head the plant.

■

AMERICAN BRAKE SHOE COMPANY, BRAKE SHOE & CASTINGS DIVISION.—*Fred P. Biggs*, division president, has been named to the new position of division chairman. *Stephen S. Conway*, first vice-president, sales, has been appointed division president and chief executive officer. *John F. Ducey, Jr.*, vice-president, has succeeded Mr. Conway as sales vice-president, and *Sam R. Watkins*, formerly executive vice-president, National Bearing Division, has been named to the new position of BS&C division vice-president, railroad sales.

Harry C. Platt, vice-president, production, of Brake Shoe's Engineered Castings Division, has been appointed president of that division, succeeding N. G. Belury, recently appointed sales vice-president for the American Brake Shoe Company.

■

PENNSYLVANIA SALT MANUFACTURING COMPANY.—*Hugh C. Land*, manager of manufacturing of the Industrial Chemicals Division, has been appointed general manager of that division, in charge of production and sales. He succeeds *William P. Drake*, recently named executive vice-president.

■

SCHAEFER EQUIPMENT COMPANY.—*Frederic M. Schaefer*, executive vice-president, has been elected president, succeeding to the position held by his late father, *Frederic Schaefer*.

■

GOULD-NATIONAL BATTERIES.—*George P. Millington*, district manager at Philadelphia, has been appointed Atlantic regional manager of the industrial division, with headquarters at Philadelphia.

■

FAIRBANKS, MORSE & CO.—Sales and service headquarters for Connecticut, New York, New Jersey, Eastern Pennsylvania, Maryland, Delaware and Virginia have been opened at Fair Lawn, N. J., replacing domestic and export sales offices and a scale service shop, formerly located in New York, and the warehouse and shipping center, formerly located in Philadelphia. The Railroad Division office remains at 230 Park avenue, New York. Among those now headquartered at Fair Lawn are *F. C. Johnson*, manager; *C. N. Malone*, assistant manager; *R. J. Bouffard*, manager diesel sales; *C. C. Libby*, manager electrical sales, and *M. O. Anderson*, manager repair and service department.

■

FAIRBANKS, MORSE & CO.—*John C. Elmburg*, manager of Fairbanks, Morse's Portland, Ore., branch, has been appointed assistant general sales manager, effective July 1, upon retirement of *Harry L. Hilleary*. *William F. Wahlenmair*, electrical department manager, has been named to succeed Mr. Elmburg as Portland branch manager.

Stephen S. Conway

Pach Bros.

John F. Ducey, Jr.

Sam R. Watkins

Harry C. Platt

Stepped up research and testing activities of the Southern Pacific have been centralized in the newly created Department of Research and Mechanical Standards described on page 57 of this issue. Enlarged and modernized, the laboratory shown here serves as the center for chemical and physical analyses for SP lines west of El Paso. Laboratories at other points will be primarily concerned with testing diesel locomotive parts, fuels and lubricants.

cool air for America's most pampered travelers . . .

. . . when safety and passenger comfort is at stake, American Railroads take nothing for granted. That's the reason so many JOY plugs and receptacles are being used to connect *stand-by* power to air-conditioning units in railway cars. Carefully designed to satisfy the most exacting safety requirements, these one-piece molded Neoprene connectors can't be surpassed for long-range, trouble-free service. Shatter-proof, moisture-tight and wear-resistant — they cannot crack and will not become *out-of-round* when dropped or struck hard blows.

RIGHT ANGLE STYLE *(Grounded)*
90° plug has replaceable contacts. Furnished as 21" long jumper with "snap-out" plug on other end. Mating female plug for power line supplied in attachable or molded-to-cable design.

ATTACHABLE STYLE *(Grounded)*
Can be quickly attached to or detached from cable without special tools. Has screw-type terminal lugs and a one-piece molded Neoprene sleeve that fits over cable/plug junction. Replaceable contacts.

MOLDED-TO-CABLE *(Grounded)*
Cable and plug factory molded into a resilient one-piece assembly. Supplied with 36" cable leads or molded to cable lengths as specified. Provides maximum strength at cable/plug junction. Contacts replaceable.

NOTE: JOY attachable and molded-to-cable air-conditioning plugs also available in ungrounded styles. Write for full details on them and *safety sectionalization* with JOY "snap-out" plugs.

Ask us for details on JOY'S Complete Line of Products for Modern Railway Needs

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SINCE 1851 · OVER A HUNDRED YEARS OF ENGINEERING LEADERSHIP

SUPPLY TRADE NOTES

(Continued from page 102)

INTERNATIONAL NICKEL COMPANY.—A new plating laboratory, the main feature of which is said to be the world's only fully automatic pilot plating plant, was unveiled April 14 at the Bayonne, N. J., Research Laboratory of International Nickel. This pilot plant permits the testing of new plating processes and metallic coatings under conditions virtually similar to those existing in actual plating plants.

At the same time, the company announced development of three new products—two welding electrodes and a special, corrosion-resistant high nickel alloy. One of the new electrodes, Inco-Rod A, a multipurpose rod, is expected to reduce substantially electrode inventories in the average plant. The other, No. 132 Inconel electrode, welds Inconel to itself. The third product, Nionel, is a versatile high nickel alloy capable of resisting corrosive attack by a large number of hot acids and mixtures of acids.

■

NATIONAL MOTOR BEARING COMPANY.—*William G. Ringland*, formerly with the New York Central, has affiliated with National Motor Bearing as eastern district manager of the Railroad Equipment Division, at New York.

■

ELECTRIC STORAGE BATTERY COMPANY.—*H. H. Warren*, assistant manager of the New York sales office, has been appointed assistant sales manager of Exide Industrial Division, at Philadelphia.

■

PYLE-NATIONAL COMPANY.—*William C. Croft*, executive vice-president, has been elected president and a director. *Harold V. Engh*, whom Mr. Croft succeeds as president, asked to be relieved of his duties as chief executive officer, but will continue as a director.

A. E. Ganzert, formerly chief engineer of Mars Signal Light Company, has been appointed consultant for Pyle-National.

■

DAYTON RUBBER COMPANY.—*William F. Moore* has been appointed representative for the southeast section for the Railway Division, with headquarters at 1055-59 Spring street, N.W., Atlanta, Ga. Mr. Moore was formerly associated with the Unistrut Products Company, Chicago, and Continental Tooling Service, Inc., Dayton, Ohio.

P. R. Keller

T. R. Wagner

■

BUDD COMPANY.—*Percy R. Keller*, assistant general sales manager, has been elected vice-president—railway sales, Eastern region, at Philadelphia. *Thomas R. Wagner*, regional sales manager at Chicago, has been elected vice-president—railway sales, Western region, with headquarters in Chicago.

■

HARNISCHFEGER CORPORATION.—*Odis Small, Jr.*, has been appointed railroad sales manager. Mr. Small was formerly associated with the Electro-Motive Division of the General Motors Corporation.

■

WILLSON PRODUCTS, INC.—RAYO-O-VAC COMPANY.—Willson Products, has been purchased by Ray-O-Vac. *J. Clyde Ryan*, executive vice-president of the latter company, has been elected president and general manager of Willson Products, succeeding *Thomas A. Willson*, elected chairman of the board.

■

WESTINGHOUSE AIR BRAKE COMPANY.—*Oscar Bergman*, service engineer for the southeastern district of the Air Brake Division, has been appointed representative for the same district, with headquarters at Washington, D. C.

W. G. Ringland

MAGNAFLUX CORPORATION.—*Roy O. Schiebel* has been appointed sales manager at Chicago, succeeding *Lloyd J. Oye*, resigned. *Robert G. Strother* has been appointed Eastern Region manager; *Kermit A. Skeie* succeeds Mr. Strother as Western Region manager in Los Angeles, and *Denis P. Walsh*, assistant to the vice-president, succeeds Mr. Skeie in Chicago as manager of the Central Region.

Mr. Schiebel became Los Angeles branch manager in 1942. After the war, in 1945, he returned to Chicago as midwest district

(Continued on page 108)

W. F. Moore

O. Bergman

Odis Small, Jr.

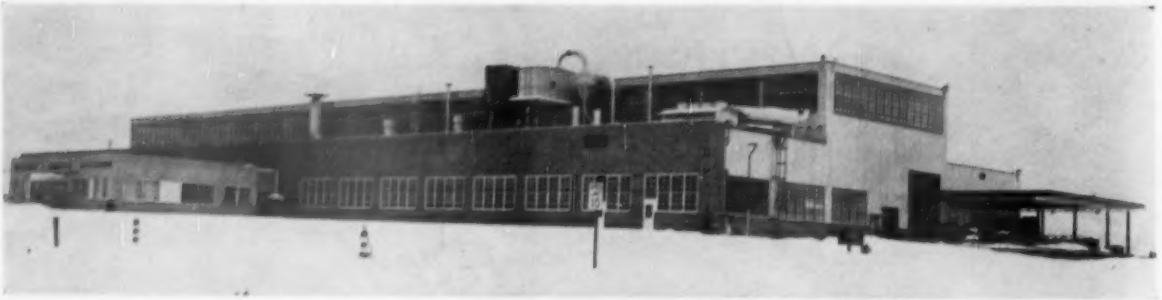
Always an operating hazard—and a constant drain on the maintenance budget—rust is a doubly dangerous enemy now when it is difficult to obtain metal replacements.

RUST-OLEUM stops rust effectively—is the practical answer to many railroad rust problems. Its tough, pliable, rust-resisting film gives excellent protection to bridges, rolling stock, metal buildings, signal equipment, tanks and many other rustable metal surfaces.

CUT YOUR MAINTENANCE COSTS

RUST-OLEUM cuts maintenance costs in two ways. (1) It prevents rust on new rustable metal surfaces so that costly replacements can be deferred longer than previously could be expected. (2) Because RUST-OLEUM can be applied *even* over metal already rusted—usually without sandblasting or the use of chemical rust removers—it saves many, many man hours. *Write for your copy of the NEW RUST-OLEUM Railroad Catalog.*

RUST-OLEUM CORPORATION
2592 Oakton Street, Evanston, Illinois



NEW BRANCH PLANT opened by the Electro-Motive Division of General Motors Corporation at North Salt Lake, Utah, April 13, provides 54,000 sq ft of floor space. It will be used as a parts distribution center and for re-manufacturing, to "new component" standards, by original factory production-line methods, diesel engines, traction motors, generators and control apparatus

SUPPLY TRADE NOTES

(continued from page 104)

manager. In 1952 he was transferred to New York as eastern district and export manager.

■

KLASING HAND BRAKE COMPANY.—The Industrial Sales Division of *Sears, Roebuck & Co.* has been appointed to handle national sales of Klasing hand brakes.

■

KOPPERS COMPANY, WOOD PRESERVING DIVISION.—*Thomas J. McGinnis*, assistant to general manager, has been named manager of the Pittsburgh district. He has been succeeded by *Ralph H. Bescher*.

■

PAXTON-MITCHELL COMPANY.—*Stephen P. Murphy* has been appointed district manager, succeeding *Howard W. Dillon*, retired. Mr. Murphy was formerly associated with Illinois Electric Porcelain Company.

■

GENERAL MILLS CORPORATION, O-CEL-O DIVISION.—*Railroad Supply & Equipment, Inc.*, Clarks Summit, Pa., has been appointed sales, engineering and service representative for O-Cel-O cellulose sponge journal box packing.

■

FRANKLIN BALMAR CORPORATION.—*John N. Merkle*, president, has been elected vice-chairman of the board, and has been succeeded by *Julius J. Kirchhof*, executive vice-president.

■

SCULLIN STEEL COMPANY.—*Thomas W. Pettus* has been elected executive vice-president. Mr. Pettus was formerly vice-president of American Brake Shoe Company and was recently assigned to overall railroad sales.

■

VAPOR CAR HEATING COMPANY, LTD.—*George F. Shaw* has been transferred from Montreal to Winnipeg; *William J. Burrows* has been transferred to Montreal from Winnipeg, and *Leonard J. Holmes* has become associated with Vapor at Montreal. In the respective areas each will sell and service Vapor-Clarkson steam generators and heating systems and controls.

■

UNION CARBIDE & CARBON CORP.—*Dr. Augustus B. Kinzel* has been elected vice-president — research, succeeding *Dr. George O. Curme, Jr.*, who is retiring.

Dr. Kinzel joined the Electro Metallurgical Company as a research metallurgist in 1926. He became chief metallurgist of the Laboratories in 1931, and a vice-president of the company in 1944. He was appointed director of research of Union Carbide & Carbon in July 1954.

Obituary

LELAND J. LYTLE, 58, district sales manager of Barco Manufacturing Company, Shaker Heights (Cleveland), Ohio, died April 13.

■

STANLEY E. GILLESPIE, retired president of Western Railroad Supply Company, died April 29 at Skokie, Ill.

EQUIPMENT... *New Ideas—New Uses*

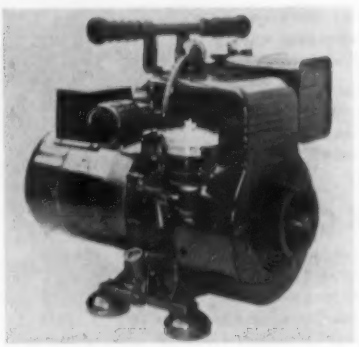
(Continued from page 28)

the same—one hr at 300 deg F or two hr at 250 deg F. An important feature is its thinner construction, now only 5 mils thick, making it useful where space is at a premium.

It is yellow in color and has a high dielectric strength of 1,500 volts and greater solvent resistance. Tensile strength is 45 lb per in. of tape width, insulation resistance is 10 megohms at 96 per cent relative humidity, and the electrolytic corrosion factor is 0.95. It is available in 60-yd rolls in standard widths. *Minnesota Mining & Manufacturing Co., 900 Fauquier Street, St. Paul 6.*

Portable Electric Plant

The Gen-A-Matic line of portable electric plants includes 22 models, ranging



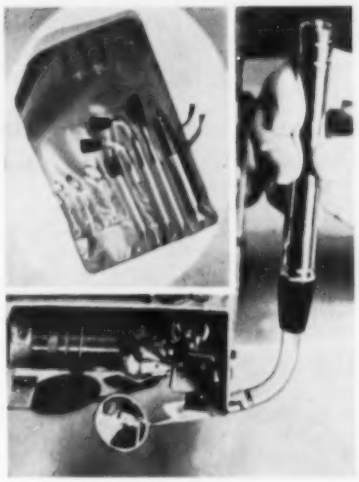
from 275 and 500 watts, 6 and 12 volts to 4,000 watts, 120-volt models. Both a-c and d-c models are available with operating speeds from 2,800 to 3,600 rpm.

Engines used to operate all models are ruggedly constructed 4-cycle units. Each unit is engineered for long, heavy-duty service, designed to give instant power whenever needed. They can be used as the sole source of power where central station service is not available; as protection against power failure; for operation of power tools on remote locations; and for auxiliary lighting. *Multi-Matic Corporation, 14741 Bessemer street, Van Nuys, Cal.*

Corrosion Penetrant

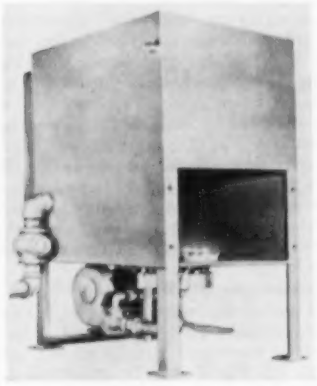
Corroded nuts and studs, and seized machinery parts can be loosened with this non-oily penetrant. The manufacturer claims that it is fast-acting and penetrates deeply. Puritan Penetrant is odorless and does not

spread over the work. Several minutes after its application, the work is tapped with a hammer and disassembled with the proper tools. The penetrant is supplied in containers from half-pint to 5-gal size. *Olin Mathieson Chemical Corporation, 10 Light street, Baltimore 3, Md.*



Inspection Kit

Inspection may be speeded and simplified with the Syte-Ayde which provides light in out-of-the-way places. Powered by flashlight batteries, the Syte-Ayde kit has four styles of light transmitting rods. The two straight rods are 3½-in. and 6-in. long. Of the same lengths, the other two are bent 90-deg. Three 1.5-power mirrors are supplied with clips that fit the rod ends. These mirrors have diameters of ½-in., ¾-in., and 1¼-in. All parts are contained in separate compartments of a plastic kit. *General Scientific Equipment Company, 2700 W. Huntingdon street, Philadelphia 32.*



Gas-Fired Small Parts Washer

This compact small parts washer, said to be suited for use with commercial cleaning compounds, is fired by a gas-fired "Radiant Heat" system. It is available in three sizes—100,000, 129,000 and 158,000 Btu's per hr. The tank is of heavy gage welded steel construction with structural reinforcements. It holds approximately 50 gal, and is complete with an inclined trough for scum removal and an overflow drain outlet.

The unit is equipped with safety control and an automatic gas valve to supervise pilot operation and main gas supply. The manufacturer states that the temperature of the cleaning compound can be raised from 50 deg to 200 deg in approximately 1 hr. *Burdett Manufacturing Company, 3433 West Madison street, Chicago 24.*

Corrosion-Resistant Metal

Nionel is a high nickel alloy which with its molybdenum and copper content is resistant to hot sulphuric and phosphoric acid solutions. The chromium content is sufficient that the alloy also resists a wide variety of oxidizing chemicals. Nionel is approximately 40 per cent nickel, 21 per cent chromium, 3 per cent molybdenum, 1.75 per cent copper, 31 per cent iron and small amounts of manganese, silicon and carbon. The metal is recommended for handling acids, pickling solutions, bleaches and other corrosive liquids. *International Nickel Company, 71 Wall street, New York 5.*

Hand Operated Splicing Tool

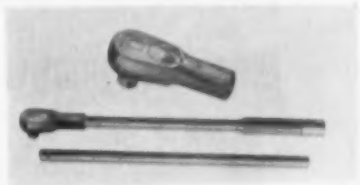
The standard type C-24 hand-operated splicing tool for splicing and terminating all circuit wiring work appears now in an improved lighter weight version. A 20 per cent reduction in tool head thickness plus a 20 per cent reduction in overall tool weight is said to result in better balance which permits the user to work with the tool for longer periods with less effort and fatigue.

Featuring a four-way crimping action, the device splices various combinations of stranded and/or solid wires from two No. 18's to three No. 8's or two No. 6's with two sizes of all-copper splice caps. Termend lugs of one barrel size are efficiently installed over a wide wire range of No. 16 through No. 8 inclusive. They are available in three tongue styles and in various stud sizes.

Vinyl insulators for splice caps offer fixed insulation protected for all splices. Open or closed end splice caps, vinyl insulators and termend lugs are UL and CSA approved. *Buchanan Electrical Products Corporation, Hillside, N.J.*

Industrial Paper Tape

Although leaving no adhesive deposit when removed, the No. 131 Behr-cat Flatback paper tape has high strength and adhesion. It has been used to hold protective covering on machine tools and other heavy equipment during manufacture, storage and shipment. Fiber tubes and cartons are sealed with it. A tensile strength double that of standard paper tapes is claimed. The 60-yd rolls are manufacured in widths from ¼-in. to 3-in. *Behr-Manning, Troy, N. Y.*



Heavy-Duty Ratchet Head

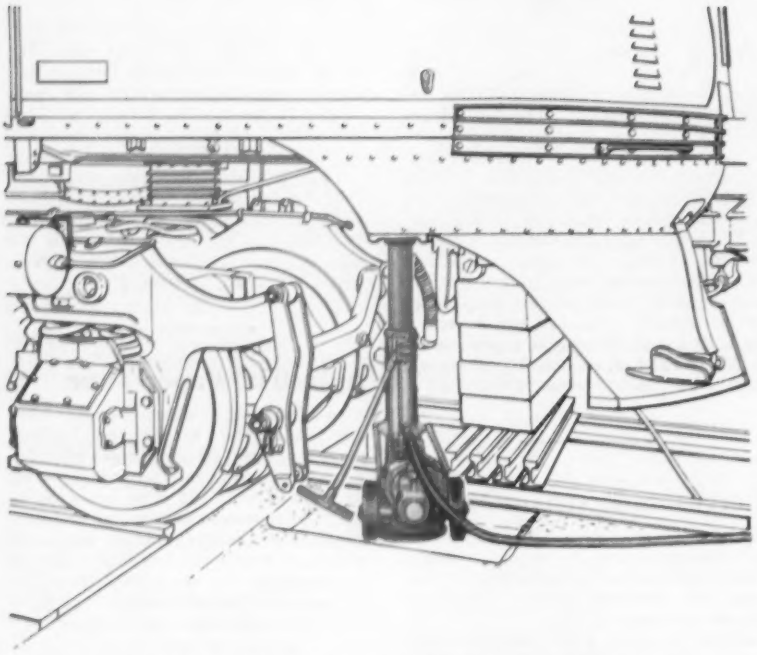
This ¾ in. square drive heavy-duty ratchet head is drop-forged from alloy steel, fully heat-treated for added strength and finished in satin chrome-plate. Its heavy-duty ratchet gear has 24 teeth instead of the usual 16 for quicker, smoother action. A shift lever on the head reverses ratchet action instantly.

A choice of two handles is available, plain or with knurled handle grip. A length of 20 in. for either handle offers more than adequate leverage for the ratchet head. *J. H. Williams & Co., 400 Vulcan Street, Buffalo 7.*

Portable Grinder

Power on this unit has been upped 85 per cent over that of the previous model through the introduction of a motor tailored to grinding operations, according to the manufacturer. Tool weight has been reduced 1-½ lb.

The device, a 6 in. grinder, is designed for continuous duty, incorporating lubricant-sealed ball-bearings. Its centrifugal



How One Man Can Raise the Heaviest Diesel Locomotive in a Few Minutes!

Take two Duff-Norton Air Motor Power Jacks, wheel them into position under the locomotive frame, connect them with an air hose "Y," turn the valve that starts compressed air into the jacks' built-in air motors, then sit down if you wish and watch as the load goes up evenly, smoothly, safely—in a few minutes you can proceed with repairs. Locomotive trucks, for example, can be completely replaced in about 2 hours!

Tests conducted by various railroads in their own shops have shown savings in time and labor that pay for these air motor jacks in a few months.

Get the complete specifications of the various time and labor-saving Duff-Norton Air Motor Power Jacks. They vary in capacity from 20 to 100 tons. Write the world's oldest and largest manufacturer of lifting jacks for catalog AD-11G, Duff-Norton Company, P. O. Box 1889, Pittsburgh 30, Pa. Canadian plant—Toronto 6, Ontario.

DUFF-NORTON

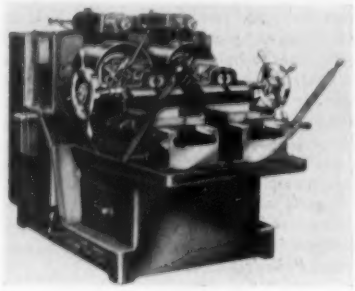
"Giving Industry A Lift Since 1883" **Jacks**

fan produces extreme air velocity through the commutator section, thereby permitting the motor to run cool. Exhaust air is directed away from the operator.

The lower steel inspection plate has been desigend to absorb rough treatment. It also seals the lower side of the field case, thereby preventing pickup of dirt from the work surface. The unit measures 24-½ in. overall and weighs 18-¼ lb with a spindle speed of 3,750 rpm. It is available for either 115- or 220-volt a-c or d-c operation. *Black & Decker Mfg. Co., Towson, Md.*

Compressor Intercooler

Intercoolers fabricated with integral-finned cast-aluminum radiation elements are available for many models of compressors used on diesel-electric and electric locomotives. The radiation element is designed for 500 psi pressure and has the cooling capacity of 40-ft of 1½-in. pipe. The intercoolers are supplied for Westinghouse 3-CD compressors and for the following Gardner-Denver models: ADX, ADJ, ABO, ABX, WXE, and WXO. Piping, fittings and flanges are welded and have threaded connections to the aluminum elements. The entire assembly is subjected to a hydrostatic test of 300 psi. *Wilson Engineering Corporation, 122 S. Michigan avenue, Chicago 3, Ill.*



Threading Machine

Designed to meet the varied requirements of both maintenance and production work, the Model XLA threading machines have rugged simplicity and the capacity to produce precision work. The machines are manufactured in single- and double-spindle designs in 1-in., 1½-in., 2-in., and 2½-in. capacity sizes. The largest will handle pipe sizes from ⅛-in. to 2½-in. Hollow milling and pointing can be done in addition to the threading of bolts, studs and pipe. Tooling for all standard thread forms is available.

The machine bed is equipped with hardened and ground ways to support the carriage. Carriages are lever operated. A hammer-blow handwheel operates the vise jaws which are equipped with grips that are quickly removed by loosening two screws. By regripping the work, unlimited thread lengths can be produced because the spindle is bored to allow the threaded stock to pass through.

A constant speed motor driving through

improve operations!

KNOW WHERE THEY ARE... Quick!

WITH 360° GYRALITES!

This new roof-top PYLE Gyralite tells a big story! Mounted on top of diesel switchers and cabooses it flashes in all directions, spotting their location instantly, day or night, saving countless steps and valuable operating time. This new 360° roof-top Gyralite makes the Pyle line of warning lights the most complete in America for protecting railroad personnel and equipment. Literature upon request.

SINCE 1907

THE PYLE-NATIONAL COMPANY

WHERE QUALITY IS TRADITIONAL

1336 North Kostner Avenue, Chicago 51, Illinois

District Offices and Representatives in Principal Cities of the United States. CANADIAN AGENT: The Holden Co., Ltd., Montreal
Export Department: Railway Supply Co., 30 Church Street, New York

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NO...but cleaned with LIX to work like new!

Yes! Lix Diesel Klean Heavy cleans electrical parts to look and work like new, yet does not harm the metals. Just remove the rubber parts, soak in Lix Diesel Klean Heavy and rinse with water or solvent. Lix makes metal parts brighter than new.

- **NO BRUSHING NECESSARY**
- **NO GRANULAR DEPOSITS**
- **REDUCES AFTER-RUSTING**
- **MAKE PARTS INSPECTION EASIER**

Lix Diesel Klean Heavy is harmless to all types of metals during the cleaning process. Lix Diesel Klean Heavy cleans all metals safer, faster—and in the same tank.

All spent Lix Diesel Klean can be reduced and used for cleaning trucks, pits and etc.

Whatever Diesel cleaning requirements you have can be done better and faster with Lix Cleaners.

A FREE demonstration can be arranged in YOUR shop — Call Us Today!

Manufacturers of Lix Diesel Klean Heavy and Lix Electric Equipment Cleaner

THE Lix CORPORATION

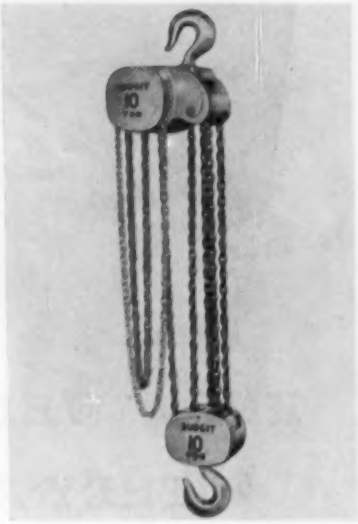
PRODUCTS OF RESEARCH

716 EAST 85TH STREET, DEPT. RL-6
KANSAS CITY, MISSOURI

a four step sheave and V belt gives ample speeds for threading all diameters handled by the machine. Speed changes are quickly made after releasing the belt tension with a foot lever. Double spindle machines have two motors. A push button station controls starting, stopping, jogging, and direction of spindle rotation. Left and right hand threads can be produced.

Model LLH die heads are used. All wear surfaces are hardened and ground. The revolving die head is automatically opened and closed at the ends of the stroke with an air operated machine yoke. The head can be equipped with either radial or tangential chasers. A micrometer adjustment for controlling thread diameter is supplied.

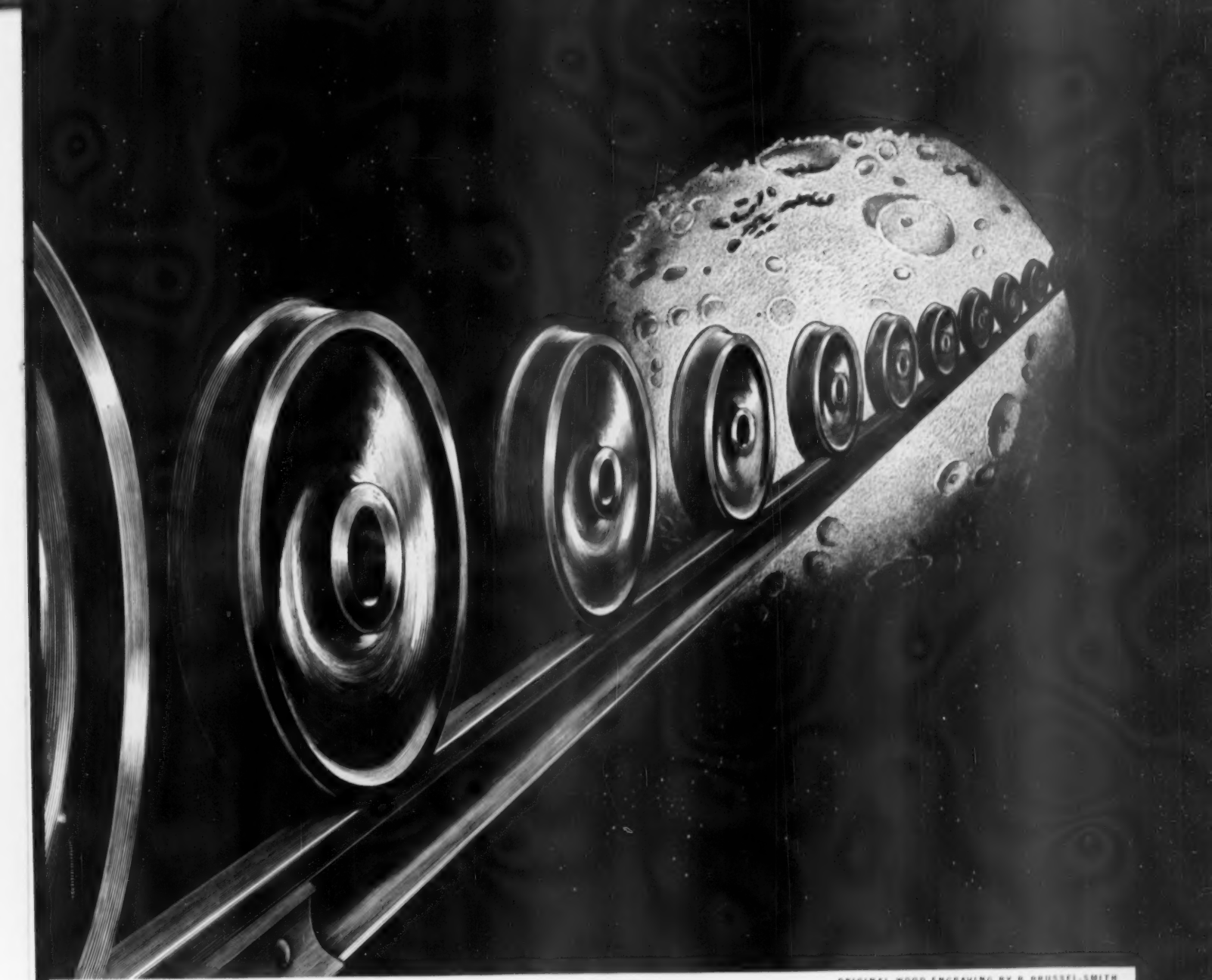
Optional equipment includes a leadscrew, mechanically closed die head if air is not available, and internal trip for producing uniform thread lengths. The machine can be equipped to do multiple pass threading, and a reaming and chamfering attachment is available. A two-speed gear box can be applied to double the cutting speed range. *Acme Machinery Division, Hill Acme Company, 1209 W. 65th street, Cleveland 2.*



Lightweight Chain Blocks

The Budgit Hi-Cap aluminum chain blocks were developed for rugged service where low headroom, portability and ease of operation are required. The frame and covers are made from a tough, shock-resisting aluminum alloy, and the upper hook suspension arm is cast as a part of the frame. The upper hook is one size larger than the lower, and both hooks are of the non-fracturing type that slowly open under extreme overloads.

Splined connections, alloy-steel heat-treated gearing and shafts, and anti-friction bearings are used throughout. The gear design is arranged to distribute the loads over two sets of gear teeth. A non-gagging four pocket lift wheel enclosed by a floating chain guide permits operating the hoist in any position. The blocks are available in 3-, 4-, 5-, 6-, 8- and 10-ton



ORIGINAL WOOD ENGRAVING BY B. BRUSSEL-SMITH

these cast steel wheels are rolling back!

It's 238,857 miles to the moon—yet many Southern® cast steel wheels have already covered this distance and are well on their way back! In fact: five test cars have averaged over 275,000 miles, and one has rolled up more than 350,000!

Road tests on Southern cast steel wheels have taken *eight years* to run. They have yielded valuable experience that cannot be obtained in any other way. Laboratory tests and accelerated life tests are vital too—we were running these on our cast steel wheels over ten years ago—but in actual service there is no substitute for the test of time.

You can put this time-proven, service-proven, machined-tread Southern wheel under your freight cars for *lower cost* than other steel wheels.

SOUTHERN WHEEL DIVISION

AMERICAN Brake Shoe COMPANY

230 PARK AVENUE, NEW YORK 17, N.Y.

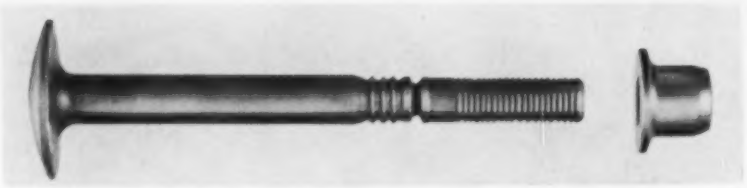
A-843

capacities. *Shaw Box Crane & Hoist Division of Manning, Maxwell & Moore, Inc., Muskegon, Mich.*

Single-Coat Car Enamel

A one-coat freight-car enamel, Kem-Kold-Bild, is claimed to produce two-coat results when applied with conventional cold spray equipment. This synthetic high-solids enamel gives a 0.00125 to 0.002-in. dry-film in a single coat, and has a gloss finish. No surface sagging has been shown with a coat as heavy as 0.0025 in. Under normal drying conditions cars have been stencilled two or three hours after painting.

Kem-Kold-Bild is recommended for use over a zinc chromate primer. It has shown no tendency to lift or otherwise adversely affect the primers now in general use. This single-coat car enamel is supplied in standard railroad colors. *Sherwin Williams Company, Transportation Division, Cleveland 1.*



Non-Twisting Bolt

Type CL Huckbolts designed for permanent fastening of wood to metal, can be installed at the rate of 25 per min. Their large bearing surfaces give a positive clamp that will not spin or loosen from vibration and twisting.

Available in steel with brazier or countersunk heads, the bolts are said to be ideal for fastening wood floors, sides and ends of freight cars, as well as for metal treatment of thresholds. The Huckbolt can easily be installed by one man. It is inserted in the hole and the collar slipped over the extended pintail. A pneumatic or hydraulic pull gun automatically tightens the device to uniform tension, forcing the wood tight to the metal, and swages the collar into the locking grooves. The pintail is automatically broken and ejected. *Huck Manufacturing Company, 3480 Bellevue avenue, Detroit 7.*

NOW! ONE WELDER

IDEALARC... GIVES YOU

BOTH AC and DC

WELDING CURRENT

NOW DC Industrial Welder for operation on single phase power lines

NOW Rectifier Welder with both current and voltage controls

NOW Rectifier Welder with arc-booster starting

● One machine, Lincoln Idealarc, now gives you *both* AC and DC welding current. You have *both* current control and voltage control. For every job, you can now select the ideal arc . . . soft arc or forceful arc . . . AC or DC.

Shops which do not have 3 phase power can now use DC. Idealarc is the only DC welder to operate from single phase power available at reasonable prices in industrial sizes.

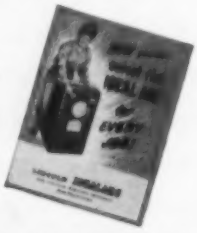
With dual arc control on DC, you have the same benefits of soft arc and forceful arc for welding with DC as with AC. Arc-booster starting on both AC and DC . . . on both soft arc and forceful arc . . . assures non-sticking, easy operation, speeds intermittent welding, gives full penetration at the start of each weld.

Idealarc cuts duplication of welding equipment . . . saves on welder cost. So why tie down your operations with one choice of welding current? Idealarc provides complete freedom to select the correct arc type and welding current for maximum speed, maximum ease and quality of welding . . . for the same investment.

SEND FOR FACTS

Send for Bulletin 1345

Shows how you can cut welding costs . . . now. Write:



THE LINCOLN ELECTRIC COMPANY

DEPT. 4602, CLEVELAND 17, OHIO

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

Portable Vise Stand

According to the manufacturer, the unit makes an efficient on-the-job work bench for the pipe fitter. The stand sets up or takes down in a jiffy, as it is constructed of one piece with no loose parts. Its built-in tray pushes up and folds for easy carrying and compactness. Though light in weight for portability, the device is sturdy and won't fold up in use.

Features of the unit include a large size vise base for easy mounting of Toledo or other vises, three pipe benders, plenty of tool slots, pipe rest and ceiling brace. *Toledo Pipe Threading Machine Company, Toledo 4, Ohio.*

Open Gear Mist Lubricator

This spray control valve operates automatically in conjunction with centralized lubrication systems to provide controlled mist lubrication for open gears. The valve may be assembled to any lubricant injector in the centralized system, mounted either adjacent to, or remote from, gears to be lubricated.

As the injector begins to discharge lubricant, movement of the injector indicator stem permits the spray control valve to open, allowing regulated air to pass the

PROVED!

BEST BY TEST

• In two years of actual road service, Leslie-Supertyfon Air Whistles have proved most dependable, most audible, most trouble-free of all air whistles.

SEND FOR — Technical Data Sheet 531

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LESLIE CO., 275 Grant Avenue, Lyndhurst, New Jersey

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NEW • REBUILT • REPAIRED

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Ready for immediate delivery and trouble-free service.

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Improved Designs • Better Built • To Your Needs

COMFORT • SAFETY • ECONOMY • ALL STEEL

Cars Designed and Built to Meet Special Loading and Operating Difficulties

ENGINEERING "KNOW HOW" BACKED BY MORE THAN 30 CONTINUOUS YEARS OF EXPERIENCE.

RAIL & INDUSTRIAL EQUIPMENT CO., INC.

30 CHURCH STREET, NEW YORK 7, N. Y.

EX-CELL-O'S big inventory guarantees deliveries . . . So your inventory can be small

Today, railroad equipment is more uniform than ever before. To you who use Ex-Cell-O hardened and ground steel pins and bushings (more than 200 railroads and equipment builders do), this means

LOWER PRICES, whether you buy one or a thousand;
IMMEDIATE SHIPMENTS;
INVENTORY REDUCTION for you.

Keep on hand a catalog of Ex-Cell-O hardened and ground steel Pins and Bushings, for all types of motive power and car equipment. Write Ex-Cell-O today for as many copies as you'll need.

Awaiting your order from Ex-Cell-O in Detroit is a huge stock of Pins and Bushings.

RAILROAD DIVISION

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

Clean Your Air Filters Faster and with Less Labor

BEFORE AFTER

Batch cleaning of all types of filters by the Magnus Method eliminates handling of individual filters throughout the cleaning, oiling and drying operations.

Labor Costs Reduced

As a result, labor costs are reduced to the part-time wages of one unskilled worker. Cleaning in batches of several filters at one time also enables you to keep ahead of schedule with a supply of cleaned filters always on hand.

Better Cleaning Results

Filter cleaning by the Magnus Method is far better than is obtainable with steam gun, spray or geyser type equipment. Filters are cleaned, corner to corner, of all dirt and clogging deposits. Initial equipment cost is surprisingly low.

Use the coupon below to obtain complete information on the Magnus Filter Cleaning Method.

magnus CLEANERS

Railroad Division
MAGNUS CHEMICAL CO., INC.
77 South Ave., Garwood, N. J.

Please send information on Magnus Filter Cleaning Method.

NAME_____ TITLE_____

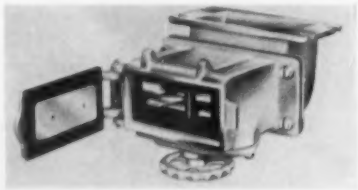
COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

spray nozzle which atomizes lubricant into a fine, uniform mist of air and lubricant.

Lubricant output can be increased, as desired, by diverting lubricant from two or more injectors through lubricant line to the adjustable spray nozzles. *Lincoln Engineering Company, 5702-14 Natural Bridge avenue, St. Louis 20.*



Trainline Receptacle

Two and 3-pole Rain-Tight trainline receptacles add safety when used in 110-volt applications. The danger of touching live parts is eliminated according to the manufacturer. An all-insulated pressure plate clamps the connector fingers in the receptacle contacts.

The receptacle meets all AAR standards. The contact insulating enclosure is a single-piece oil-resistant rubber unit designed to minimize maintenance and to provide better alignment of contacts through resilient floating action. A gasketed cast aluminum alloy housing encloses all current carrying parts. It has slotted hexagon cap screws for solder or solderless type terminal lugs. Parallel barriers molded into the rubber insulation unit separate and align the wire connections. *Pyle-National Company, 1340 N. Kostner avenue, Chicago 51.*

Mobile Communications Power Supply

This dynamotor permits the use of 6-volt or 12-volt mobile communications equipment on 32-, 64- or 110-volt diesel locomotives. With it, switch engines can easily be tied in with the rest of the railway communication system.

They are rated at 70-volts input, 12.8 volts at 5 amp receive and 18-amp transmit. A steady output of 12.8 volts, plus or minus 10 per cent is maintained even with input varying from 5 to 18 amp. Regulation at fixed input is only 0.7

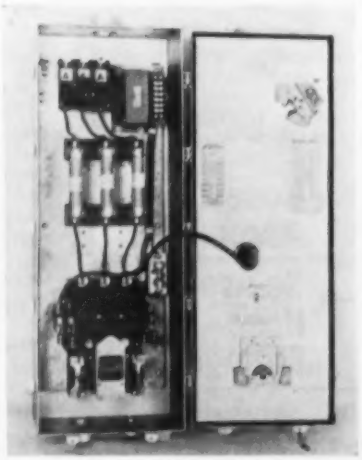
volts transmit to receive. This regulation results from operating a machine capable of 500 watts continuous at less than 100 watts continuous, and less than 250 watts intermittent. Underloading permits slow speed and low temperature rise.

Standard models are available in four input ranges, from 33 to 74 volts, with outputs of 6.3 and 12.8 volts. They are 12-⅝ in. long, 6-11/16 in. wide, 7-¾ in. high, and weigh 47 lb. *Carter Motor Company, 2644 N. Maplewood avenue, Chicago 47.*

Color Tube Paints

A paint color tube system, known as Surfastyle custom colored paints, gives 324 colors for both inside and outside use. Twelve tube colors are combined with base paints to produce this variety of finishes. Two base paints are supplied for each of the following: interior flat, gloss, semi-glass, enamel, and exterior house paint.

The colorant and base are completely compatible and easily hand-mixed. Their use gives a wide range of colors and finishes with a small inventory of paints and tubes. *McDougall-Butler Co., Buffalo 14.*



Linestarter Enclosures

A water-tight enclosure for all combination linestarters through NEMA size 2 has been made available. Fabricated from sheet steel, the enclosure is claimed to be lighter and easier to install than conventional cast iron enclosures.

Finished in bright aluminum, they are equipped with Oil-Tite pushbuttons with neoprene caps to prevent accumulated ice or sleet from interfering with button operation. A gasket and cover held by screws makes the enclosure weather-proof, water-tight, and dust-tight.

Ample wiring is provided within the enclosure. A control circuit transformer can be easily added. External mounting

Does MANUAL BRAKE ADJUSTMENT cost you real money every year?

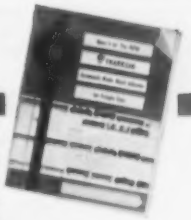


Figure it this way . . . add up the time-costs for adjusting brake piston travel manually. Lost traffic due to terminal delays and yard congestion can be very expensive too. So any way you add it up . . . manual brake slack adjustment is costing you plenty every year . . . and not one cent is necessary. Here's why:

Set it and forget it!

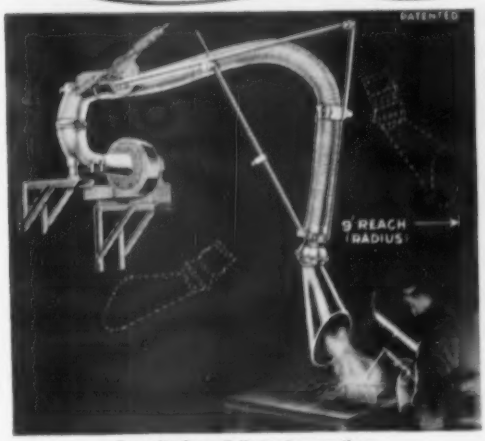
Franklin Automatic Brake Slack Adjuster automatically maintains correct travel of brake cylinder piston. Needs no adjustment or lubrication during the entire life of brake shoes. Completely automatic features make it "foolproof" against negligence and error. It is not affected by train shock or car dumping. You set it . . . forget it. The Franklin Automatic Slack Adjuster is the best money-saving, time-saving investment your railroad can make. It is easily and economically applicable to all types of freight cars . . . including hoppers. To get the facts . . . write for technical bulletin B-1201!

FRANKLIN BALMAR CORPORATION

Woodberry, Baltimore 11, Maryland

Chicago Office: 5855 W. Lawrence Avenue, Chicago 30, Ill.

"It certainly is a relief to have fumes and heat removed while I'm welding. The Ruemelin Collector has great suction. It makes a day's work pleasanter!"



Ruemelin Fume Collector in operation.

Welding shops equipped with Ruemelin Fume Collectors are assured of a clean shop atmosphere. Noxious fumes, heat and smoke are eliminated at their source, thus improving working conditions, lessening fatigue and paving the way for increased plant production.

The Ruemelin Fume Collector hood can be instantly placed where needed anywhere in the booth welding area. No tedious adjustments necessary. Just pull the inlet hood to the welding position and you are ready to go.

Note the new spring-loaded counterbalance mechanism which makes Fume Collector much easier to handle. Ask for Bulletin 37-E illustrating this new feature.

RUEMELIN MFG. CO.

MANUFACTURERS AND ENGINEERS

SAND BLAST AND DUST COLLECTING EQUIPMENT

3982 NORTH PALMER STREET • MILWAUKEE 12, WISCONSIN, U. S. A.

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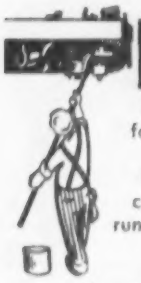
for greater
RAILROAD
MAINTENANCE
SERVICE
FINE ORGANICS offers
2 EMULSION CLEANERS
that excel in
✓ SOLVENCY
✓ DETERGENCY
✓ DIRT PENETRATION
✓ EASE OF RINSING
✓ NON STREAKING
✓ NON STAINING

F.O.-106
Specifically designed for exterior car cleaning . . . the degreasing and cleaning of mechanical parts, motive equipment, engines, engine pits, shop floors.



F.O.-116
Made to fulfill the need for a heavy duty cleaner and degreaser. Used for rugged jobs, under carriages and exteriors, running gear and surfaces — and areas subject to heavy oil, asphalt and other tenacious accumulations.

The superior solvency of these two emulsion cleaners . . . the effective dirt penetration and easy rinsability cuts cleaning costs and saves valuable personnel time.

also available F.O.-162 and F.O.-102 Carbon Removers
F.O.-128 and F.O.-101 'Safe-tee' Solvents
Write to Dept. '3' for complete information

FINE ORGANICS, Inc.
211 East 19th St. • New York 3, N. Y.

feet and conveniently located knockouts facilitate installation and service. *Westinghouse Electric Corporation, P.O. Box 2099, Pittsburgh 30, Pa.*

Radial Drill

Flame-hardening the column resists scoring and is claimed to retain the built-in accuracy of this radial drill. The manufacturer also claims that this is the first flame-hardened radial column used. "Hardclad," as it has been called, is a centrifugal casting which is turned, flame-hardened, and finish-ground to close tolerances.

The 1½-hp main drive motor is mounted on an arm extension at the back of the column. This counterbalances the arm and makes the motor very accessible. Its power is transmitted through a silent chain and a drive shaft mounted in anti-friction bearings. No parts of the main drive arrangement are concealed in the head.

An alloy steel No. 3 Morse taper spindle is mounted in four anti-friction bearings adequate for the radial and thrust loads. There are nine spindle speeds and six power feeds and all speed and feed shafts are mounted in anti-friction bearings.

Many of the operating sub-assemblies are built up as complete, self-contained, and removable units. These include the feed clutch and the feed transmission. The entire internal mechanism is force spray lubricated with an oil pump. The arm is raised and lowered with a ½-hp motor.

This radial drill features two-lever, direct-reading, color-match spindle speed and feed shift dials. All controls are grouped within easy reach of the operator including the start-stop push buttons. A transformer reduces line current to 110-volts at the controls as a safety feature.

The electrical panel is built into the back of the arm. A safety switch on the panel door prevents exposing a live panel because the door can be opened only when the current is off. A guard covers the raise and lower push buttons preventing vertical movement of the arm until the barrel clamp is released.

Adequate area and weight assure stability of the waffle-ribbed base. Securely bolted to the base is a column support incorporating heavy-duty anti-friction bearings which carry the Hardclad column.

This radial has a 3-ft arm and a 7½-in.

FOR SUPERIOR RESISTANCE to ABRASION and CORROSION
Specify
STRATOFLEX
FLEXIBLE HOSE No 225

Built to give long service where conditions are especially rough on hose lines. Reinforced with high tensile strength wire braid with outer cover of tough synthetic rubber. In bulk Hose or Hose Assemblies with Stratoflex "over the cover" detachable, re-usable fittings. Write for your FREE catalog or order through your dealer.

★ Hose Assemblies
★ Re-usable Hose Fittings

Dealership Available in Some Areas

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STRATOFLEX, Inc. FORT WORTH, TEXAS
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General Offices—P. O. Box 10398 Fort Worth, Texas
Branch Plants—Los Angeles and Toronto
Sales Offices—Atlanta, Chicago, Dayton, Houston, Kansas City, Los Angeles, Portland, New York, Toronto, Tulsa

column. The drilling capacity is 1½-in. in cast iron and it can drill to the center of a 77-in. diameter circle. Accessories include coolant system, universal or box table, side bases and work light. The box table and side base are shown in the illustration. *Cincinnati Lathe & Tool Co., Cincinnati 9.*

All-Purpose Welder

The Idealarc is said to provide a welding arc for every type of manual welding application, permitting selection of either a-c or d-c and either a soft or forceful arc. It can be obtained as an a-c welder without the d-c current. To this unit a d-c package can be easily attached whenever desired. It is also available as a combination a-c and d-c machine with selection of either current made through a twist of a switch handle.

For a-c welding jobs, the machine provides a single-phase transformer type welder, the circuit of which has been designed for high arc stability. Both voltage and amperage are controlled to give the desired control of arc characteristics. The unit also has an arc booster switch for selecting normal or hot starting.

For d-c welding, the unit provides welding current through heavy-duty rectifiers. Dual-control of the arc is provided. The controls create a d-c machine with the quiet operation of rectifier welders and operating ease of motor-generator welders.

Current models available are 300, 400 and 500 amp a-c combined with d-c capacities in 200, 300, 375 and 450 amps. *Lincoln Electric Company 22801 St. Clair Ave., Cleveland 17.*

Insulated Magnet Wire

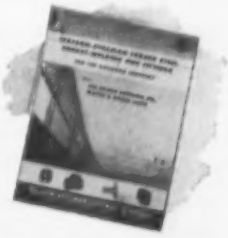
Alkanex magnet wire is said to be the toughest high-temperature film-insulated wire yet developed for use in motors, transformers, and other electrical equipment operating above 105 deg C. It has the ability to withstand hot spot temperatures up to 150 deg C and has electrical

WATSON-STILLMAN

Socket-Welding Air Brake Flanges

Simplified installation and strong, tough connections are assured with Watson-Stillman Socket-Welding Air Brake Flanges. Machined from tough steel forgings, these 2-bolt oval flanges are now available in two designs—each interchangeable with other air brake flanges. The W-S One-Piece flange, now standard equipment on many railroad cars, provides a strong, leak-proof joint with maximum resistance to shock and vibration.

The recently developed 2-piece Swivel-Joint Flange was designed to facilitate bolt-hole alignment. The flange can be rotated on the insert to any position until bolt holes line up. The Swivel-Joint flange permits most of the piping to be fabricated in the shop.



Sold Through Leading Distributors

For detailed technical information on Watson-Stillman Air Brake Flanges and other Railroad Pipe Fittings send Today for Bulletin RR-1.

WATSON-STILLMAN FITTINGS DIVISION

H. K. PORTER COMPANY, INC.
Roselle, New Jersey

R2

Manufacturers' Literature

Following is a compilation of free literature, pamplets and data sheets offered by manufacturers to the railroad industry. Circle the number (s) on the coupon below to receive the desired information; the requests will be sent direct by the manufacturers.

1. **DUCTILE IRON.** *International Nickel.* 32-page booklet (DI-25) "Ductile Iron —The Cast Iron That Can Be Bent" includes detailed specifications and mechanical property data.

2. **WHEEL GRINDER.** *Whiting Corp.* 8-page 3-color profusely illustrated bulletin (MS-C-401) "New Whiting Wheel Grinder Grinds Wheels Without Removal" includes cut-away views of construction details and actual installation photos.

3. **FLAW LOCATION.** *Turco Products.* 12-page booklet "Flaw Location by Dye Penetrants" describes in detail the Turco Dy-Chek inspection method and offers helpful suggestions on how to perform inspections on any metal by dye penetrant method.

4. **COLLOIDAL GRAPHITE.** *Acheson Colloids.* 4-page bulletin (421) contains photos, diagrams, charts and data on advantages offered by colloidal graphite in assembly and run-in of machines.

5. **CLUTCH.** *Dodge Mfg. Co.* 4-page bulletin (A-634) describes, illustrates and gives prices for the Dodge Air-Grip Clutch; cross-section drawing reveals internal construction.

6. **NON-PORTABLE COMPRESSORS.** *Worthington Corp.* 6-page editorial reprint of article "Non-Portable Compressors—and installation and maintenance guide" (RP-725) covers such points as: location, piping, temperatures, lubrication, inspection, maintenance.

7. **FINISHES FOR ALUMINUM.** *Aluminum Company of America.* 48-page multi-color booklet (AD 456) "Finishes for Alcoa Aluminum" with beautiful full-color photographs gives a comprehensive and informative description of the many ways in which the appearance and performance characteristics of aluminum can be changed.

8. **TUBE EXPANDERS.** *Gustav Wiedeke.* 4-page 3-color brochure "News Bulletin Featuring New-Modern Tube Expanders For Industry" shows the latest tube expanding equipment; photos show typical boiler and condenser units for which tube expanders are recommended.

9. **GRATING.** *Blaw-Knox.* New 16-page grating catalog (2486) "Electroforged Steel Grating and Treads" describes types, sizes and load characteristics of complete line of electroforged steel and interlocked aluminum grating made by Blaw-Knox.

10. **AUTOMATIC MACHINES.** *Ex-Cell-O Corp.* 20-page 3-color illustrated brochure (B551) "Opportunities Through Automation" describes and illustrates with large photos and informative captions Ex-Cell-O standard, transfer and special machines equipped with mechanisms for automatic loading and unloading of workpieces.

11. **CABLE VULCANIZERS.** *Joy Mfg. Co.* 16-page 2-color illustrated bulletin (B48a) "Electric Cable Vulcanizers" describes and illustrates a wide variety of vulcanizing equipment for repairing or replacing broken or bruised cable jacketing.

12. **BATTERIES.** *C&D Batteries.* Two specifications bulletins (CP-536-537 Rev. 1) cover C&D complete line of lead-calcium and lead-antimony batteries for control, switchgear and auxiliary power application; specifications include data on battery ratings and capacities.

13. **TACHOMETERS.** *Herman H. Sticht.* 8-page bulletin (770) describes, illustrates and gives specifications for all types of Standco Vibrating Reed Tachometers; shows how to read them.

14. **ROLLER BEARING.** *Rollway Bearing Co.* 4-page catalog describes new self-contained cartridge roller bearing; lists shaft and housing dimensions and bearing radial load ratings at 100 rpm.

15. **TANK CAR COATING.** *Metalweld, Inc.* 4-page illustrated reprint-bulletin "Lining and Coating Tank Cars" covers use of sheet linings, liquid synthetic resin coatings, sprayed metal coatings and combination coatings to protect equipment from chemical attack, products from contamination.

16. **ELECTRICAL CONDUIT.** *National Electric Products.* Booklet with 4-color photos describes and illustrates heavy-duty, rigid steel electrical conduit (Superduct); includes data sheets compiled by Pittsburgh Testing Labs showing how it stands up under corrosive attacks of salt spray, sulfuric acid, caustic soda, and exposure to excessive heat.

17. **CARBIDE METAL TOOLS.** *Carmet Div., Allegheny Ludlum Steel.* 8th edition of 20-page Carmet Methods Manual includes data on applications of new steel cutting grades CA-608 and CA-610; includes table of cutting speeds.

Reader Service Department — JUNE, 1955
Railway Locomotives and Cars
30 Church St., New York 7, N. Y.

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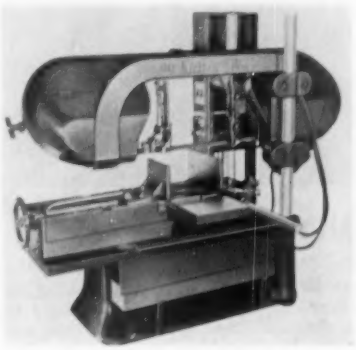
and thermal properties that will help to effect economies in the design of motors and similar equipment.

The insulation is a thin-film polyester-type with high heat-resistant properties as well as resistance to abrasion and solvents. This insulation will enable engineers to increase the horsepower of motors without increasing their size. It is estimated that 90-95 percent of all motors could operate in the Class B high-temperature range for which Alkanex is designed.

The wire is available in round sizes No 13 AWG through No 26 AWG with single and heavy-wall film thicknesses. Other sizes will be considered on a special basis. *Wire and Cable Department, General Electric Company, Bridgeport 2, Conn.*



Metal-Cutting Band Saw

The Model 1200 is a heavy-duty, hydraulically operated, metal-cutting band saw. The saw has blade pressure controls with a wide range of uniform feeding pressures. The electrical system gives over-load and low-voltage protection. All controls are 110 volt and are located for operating ease.

A rigid positive stock stop and automatic cutting cycle are provided. There are heavy-duty adjustable blade guides, adjustable stops for depth cutting and a special chip flushing unit.

The saw handles rectangular shapes 12 x 16-in. and 11 x 18-in., and 12¾-in. diameter rounds. The 1-hp motor drives the blade at selective cutting speeds of 60, 115, 200 or 300 ft per min. *Wells Manufacturing Corporation, 1516 Polk street, Three Rivers, Mich.*

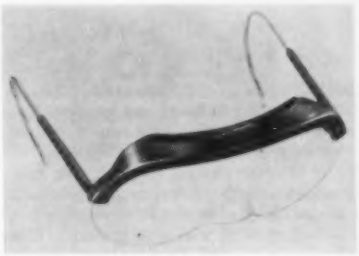
Oil-Air Ratio Regulator

This unit has been designed for controlling oil burners by the varying of pressures. It consists of an oil pressure regulator with a relatively large air operated diaphragm to control the delivery pressure of the oil. The diaphragm is subject to the variations occurring in air pressure. The ratios of the oil diaphragm which is subject to direct pressure of the oil regu-

lator discharge, and the air diaphragm, govern the final oil discharge pressure of the unit.

The regulator is installed in the oil supply line to a group of burners and located as near as practical. A connection is provided for a small air transmission line coming from the outlet side of the air control valve in the main secondary air supply line. When the secondary air pressure is varied by the control valve, the resulting pressure variation is transmitted to vary the pressure in the ratio regulator. This causes the regulator to automatically vary the delivered pressure of the oil in exact proportions to the air delivered to the burners.

The regulator is built to satisfactorily handle inlet oil supply pressures from 45 to 75 psi. *Hauck Manufacturing Company, 124 Tenth street, Brooklyn 15, N.Y.*



Safety Goggles

The large, impact-resisting, plastic lens of the FeatherSpec (Style FW3) provides ample safety on such jobs as woodworking, light grinding, spot welding, inspection and others which do not require the use of heavy-duty goggles. Its contour-line brow rest holds lenses well away from the eyes. This extra space permits cool comfort and additional clearance for workers who wear prescription glasses. The brow rest is integrally molded of bronze acetate butyrate. Distortion-free lenses are 0.040 in. thick acetate, clear or green, and can be removed easily. Matching half-plastic, half-cable temples adjust for a snug fit. *Willson Products, Inc., Reading, Pa.*

Multi-Purpose Welding Electrode

Mild steel can be welded to stainless steel with Inco-Rod "A". Strong joints can also be produced between either of these materials and high-nickel alloys such as Monel and Inconel. The rod, itself, is a high-nickel alloy composition, developed for the specific purpose of joining dissimilar metals.

Ductile and crack-free joints have been produced between carbon steel and such austenitic steels as 304, 310, 330 and 405 stainless. Also successfully welded have been 316 to 405, 347 to Croloy, and other such stainless combinations. Tests have shown the joint strength sufficient to force failure in the base metals. Corrosion tests

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It's the new BONNEY "X-4"—the amazing, muscle-saving 4-to-1 Geared-Head Wrench! Now, 1 man can do the job of 4 in all heavy assembly and disassembly work! In tightening or loosening threaded parts, there is no dangerous snap or jarring action. The Bonney X-4 *makes tough jobs easy!*

The new BONNEY "X-4" is designed as an *intermediate unit* for use with ratchets, torque wrenches, sockets, and attachments. Rugged, lightweight, portable—the unit is easily used in shop or field. A mechanic can do his own work with less effort, greater safety, with no chance of damaging equipment.

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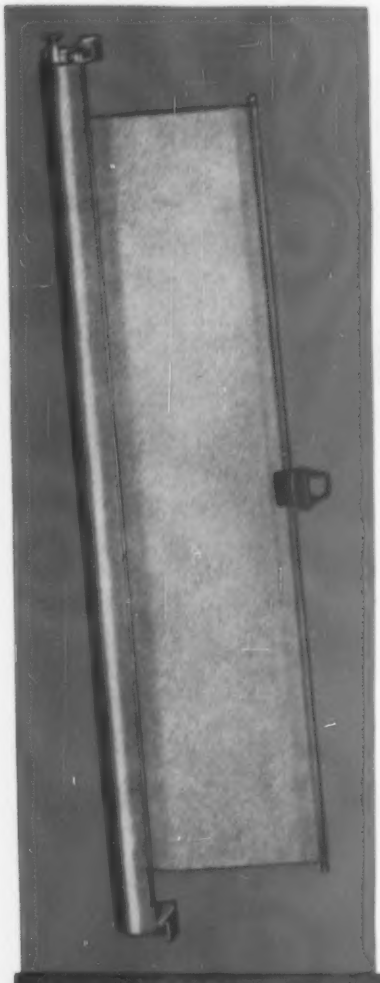

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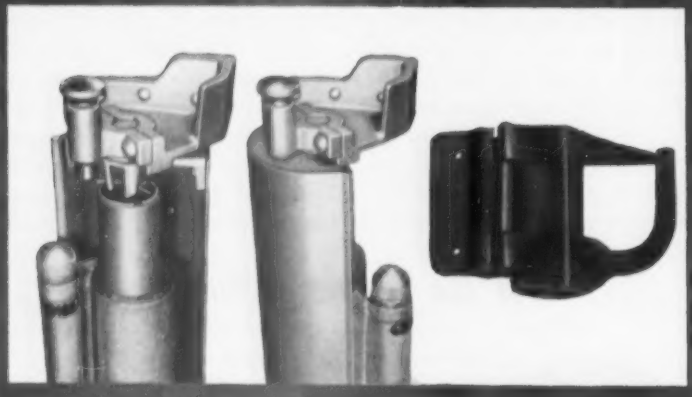

Revolving shield and casing (shield open)

Revolving shield and casing (shield closed)

The new "B-J" vestibule curtain release handle. Positive releasing feature . . . service-proven.

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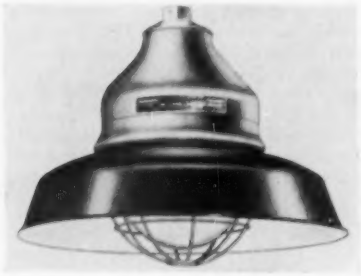
5125 West Lake Street, Chicago 44, Illinois

in most cases show the weld material superior. The rod is applied downhand and produces welds free of gas holes. Generally no preheat, postheat, or peening is necessary. The rod is supplied in 14-in. lengths and diameters of 3/16, 5/32, and ⅛-in. *International Nickel Company, 71 Wall street, New York 5.*



Explosion-proof Light Fixture

The LE series lighting fixtures are for industrial lighting in hazardous locations and are explosion-proof. They have mogul screw base porcelain lamp receptacles for 300 or 500-watt lamps. Housings are cast aluminum and the reflectors are porcelain enameled. The clear impact-resisting glass globe is protected with a steel guard. This globe has a ground flange which is held against an accurately machined surface on the fixture with a threaded ring. All other joints are threaded and locked with set screws. A choice of reflectors is available. *Pyle-National Company, 1340 N. Kostner avenue, Chicago.*

Step Ladder

Hi-Boy safety step ladders reach working levels up to 15-ft. The ladders are all-welded with a frame of ¾-in. steel tubing. They are mounted on four heavy-duty ball-bearing casters. The front casters swivel and those at the rear are rigidly mounted.

When moved into position the ladder is anchored to the floor by depressing a pedal under the first step. This causes two rubber-tipped legs to contact the floor and prevent further movement. These legs are retracted by spring action when the pedal is moved to the left. Six models with 9 to 12 steps have overall heights from 85½-in. to 114-in. All models have sturdy guard rails and non-slip step plates. *Ballymore Company, Wayne 1, Pa.*

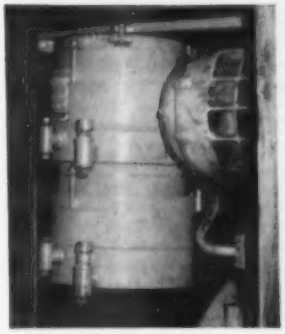
Tripod Vise Stand

The Pipemaster Tripod vise stand was designed to adjust automatically on pipe from ⅛ in. to 2½ in., and to clamp on it with less than one turn of the screw. Another feature is its 3-way, long tool-steel top jaw with milled teeth. The bottom jaws are reversible.

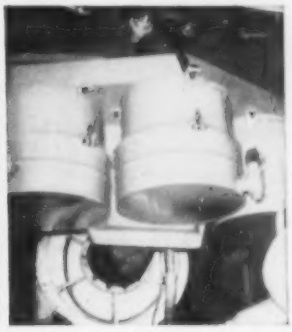
The unit has a large, hinged malleable

Two of the hundreds of AIR-MAZE oil bath diesel filter installations that...

CUT BOTH FILTER AND ENGINE MAINTENANCE—PAY FOR THEMSELVES IN A YEAR!



SOUTHERN RAILWAY. A 2 element manifolded oil bath filter on SW7 1200 horsepower switcher.



NEW YORK CENTRAL. A 3 element manifolded oil bath filter, in use on ALCO 1500 horsepower locomotive.

ALREADY FORTY RAILROADS have adopted Air-Maze oil bath air filters for hundreds of diesels used in freight, passenger and switching service. And reports show they cut both *filter* and *engine* maintenance—pay for themselves in a year!

In areas where airborne dirt concentrations are heavy, ordinary filters must be cleaned as often as twice a week. By contrast, Air-Maze oil bath air filters go at least three months without servicing. That's 24 times longer without service!

This reduced filter maintenance is not obtained at the expense of filter efficiency and increased engine wear. Air is scrubbed clean in a bath of oil and an oil-washed screen traps any remaining dust, passing only clean, oil-free air. This thorough cleaning action not only lets Air-Maze oil bath air filters go for longer periods without servicing but, more important, provides the cleaner air which extends power assembly life of the locomotive, reduces down-time, lowers engine maintenance costs.

Over 98% of all internal combustion engines in use are protected by oil bath filters. The day is coming when most diesel locomotives will benefit from oil bath air filtration. Air-Maze oil bath filters are effective at all engine speeds—do not depend on high air velocity. They work effectively at low pressure loss. And they are not affected by humidity or oil mist conditions. For further information, call on us or see your locomotive builder. The Air-Maze Corporation, 25000 Miles Ave., Cleveland 28, Ohio.

AIR-MAZE OIL BATH FILTER MODELS AVAILABLE FOR THESE LOCOMOTIVES

MFR.	HP	SERVICE	MFR.	HP	SERVICE
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Electromotive	600	Switcher	Alco-GE	2250	Rd. Pass.
Electromotive	1000	Switcher	GE-Cooper Bess.	600	Switcher
Electromotive	1200	Switcher	B-L-H	800	Switcher
Electromotive	2000	Rd. Pass.	B-L-H	1000	Switcher
Electromotive	2250-2400	Rd. Pass.	B-L-H	1200	Switcher
Electromotive	1350	Rd. Freight	B-L-H	1500-1600	Rd. Switch
Electromotive	1500-1750	Rd. Freight	B-L-H	1500-1600	Rd. Freight
Electromotive	1500-1750	Rd. Switch	F-M	1000-1200	Switcher
Alco-GE	900	Switcher	F-M	1500-1600	Rd. Switch
Alco-GE	1000	Switcher	F-M	2000	Transfer
Alco-GE	1500-1600	Rd. Switch	F-M	2400	Trainmaster
Alco-GE	1500-1600	Rd. Freight			

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Perfect Threads... 65R cuts beautiful threads—and you find the factory test sample in your new die stock to prove it. No other threader gives you as much for your money.

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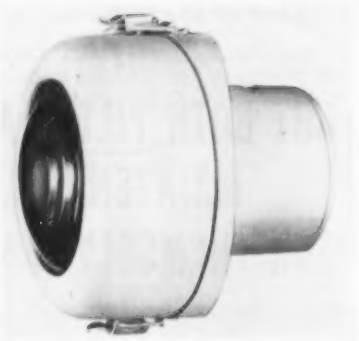
shelf that insures rigidity in use and provides space for many tools. It has a vertical visible pipe bender and ceiling hold-down screw. Its pipe legs are formed for maximum stability. *Erie Tool Works, Erie, Pa.*

Midget Volt-Ohmmeter

Called the Midgetester, this unit is a practical working instrument with ruggedness and accuracy of devices many times larger. The Model 355 can be put in the shirt pocket. It measures 2-¾ in. by 4-½ in. by 1 in. overall.

The unit has a sensitivity of 10,000 ohms per volt on both a-c and d-c circuits. It is equipped with 14 measurement ranges, 5 for a-c voltages, 5 for d-c voltages and 4 for d-c resistances. There is a clear plastic face over the front of the instrument, and a black plastic cover over the back.

Special test leads are furnished with each instrument, one red and one black for easy polarity indications. Each has a partially threaded stud on one end for attachment to the device. *Simpson Electric Co., Division American Gage & Machine Co., 5200 W. Kinzie Street, Chicago 44.*



Marker Light

The P-400006 is a single-aspect marker light for permanent mounting on coach ends. Lamps can be replaced from inside or outside the car. Two screws lock the inside cover in position, and the outside cover is held against a waterproof body gasket with toggle clamps on each side. The lamp, receptacle and inside cover are removed as a unit.

The lens is gasket mounted in the outside cover to give a streamlined appearance. Red, yellow, green and clear stepped lenses can be supplied. The two-prong bayonet-base lamp receptacle is shock-mounted for vibration protection. The body of the light fits in a 4⅜-in. dia hole in the end sheet. *Pyle National Company, 1340 N. Kostner avenue, Chicago 51.*

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"Cold" metal build-up helps beat skyrocketing replacement costs—speeds maintenance jobs

Typical Railroad Metallizing Applications

Engine crankshafts, mains, throws, fits • Engine cylinders, liners, liner flutes • Water jackets, camshaft bearings • Generator, traction motor, other armature shaft bearing fits • Compressor crankshafts • Traction motor end housings • Pump rods and shafts • Eroded or corroded portions of engine blocks • Car lighting generator pulleys • Dents and scratches in car bodies

—practically any worn part repaired at only 15 to 20% replacement cost—get equipment back in service in hours, instead of days or weeks.

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New York Central	Northern Pacific	Canadian National
Atlantic Coast Line	Pennsylvania	Chesapeake & Ohio

SPECIAL RAILROAD BULLETIN AVAILABLE—Illustrates and describes a number of these time-saving, money-saving metallizing applications. Data supplied by railroads using metallizing; photographs taken in user shops. Write for copy.

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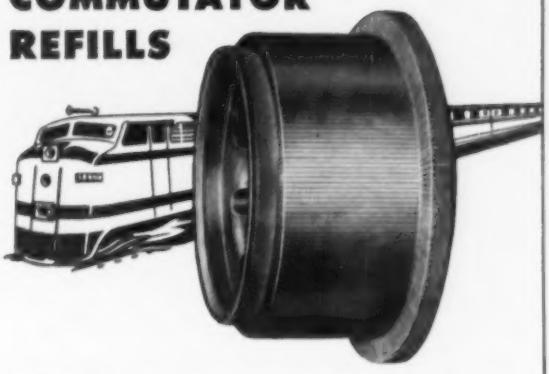
In Great Britain: Telephone: EDGEWOOD 4-1200

METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

DIESEL LOCOMOTIVE COMMUTATOR REFILLS



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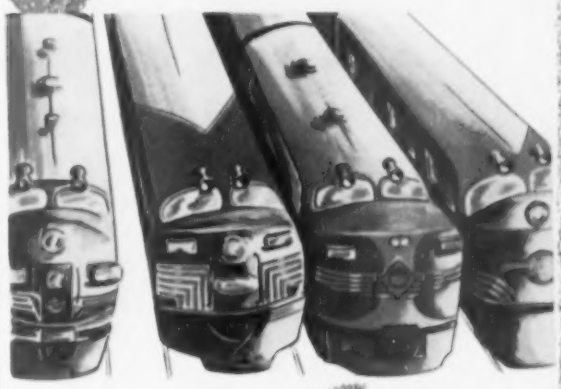

. . . There is a reason why most manufacturers of Diesels and rolling stock specify AMPLI-BOND for electrical connections in wire sizes from #8 to 4/0. It's because AMPLI-BOND Terminals and Connectors are designed to fill the specialized requirements for railway use. They are rugged enough to stand up under constant use and pre-insulated to eliminate wrapping, tape or spaghetti. The rough vinyl insulation is bonded to the terminal barrel; won't slip off or crack under crimping pressure. Hand Hydraulic and DYNA-CRIMP tools have positive crimping action to make fast, high tensile strength crimps.

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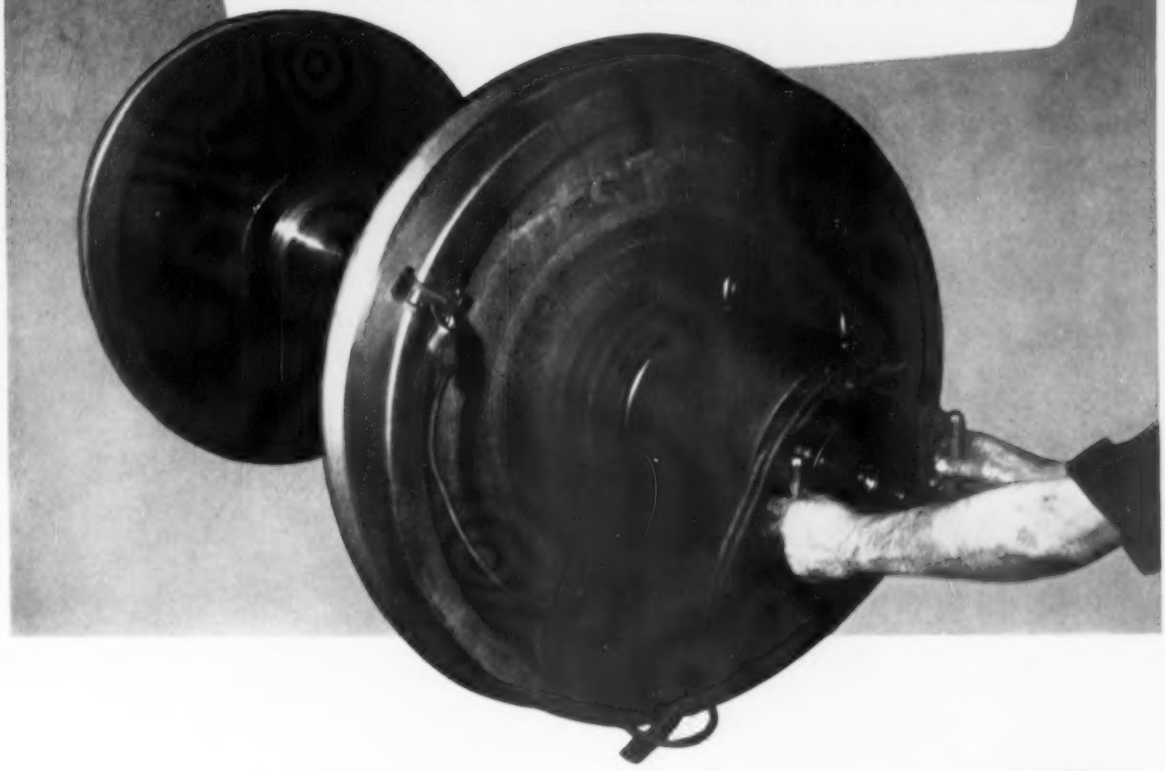

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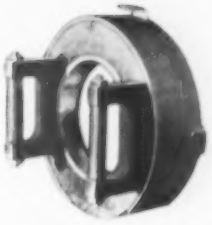

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